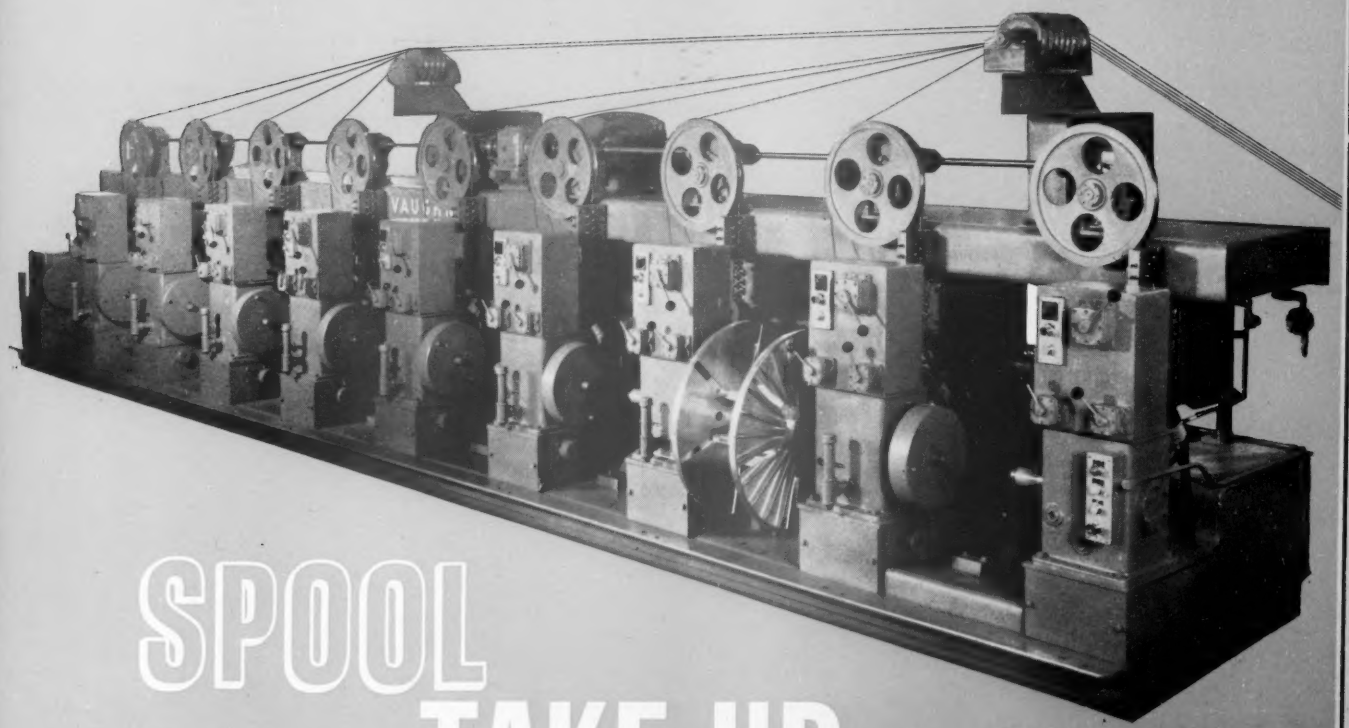
WIRE AND WIRE PRODUCTS

APRIL, 1961

NEW FROM VAUGHN!



SPOOL TAKE-UP for 2000 lb and 1000 lb spools

Spooling directly from the plating line, this new Vaughn Take-Up features maintenance of uniform tension on the wire, adjustable lay, and the production of dense, snarl-free spools with minimum operator attention. The details will interest you. Write us!

® THE VAUGHN MACHINERY COMPANY

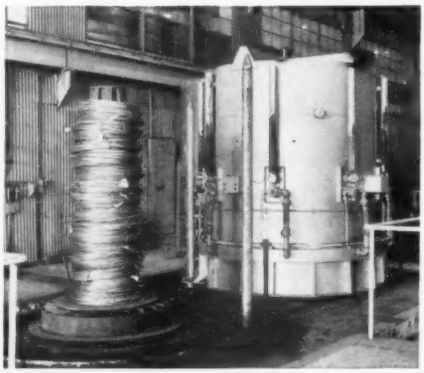
COMPLETE COLD DRAWING EQUIPMENT . . .
Continuous or Single Hole . . . for the largest Bars and Tubes . . . for the Smallest Wire . . .
Ferrous, Non-Ferrous Materials or their Alloys.

OFFICIAL PUBLICATION OF THE WIRE ASSOCIATION

a pictorial report

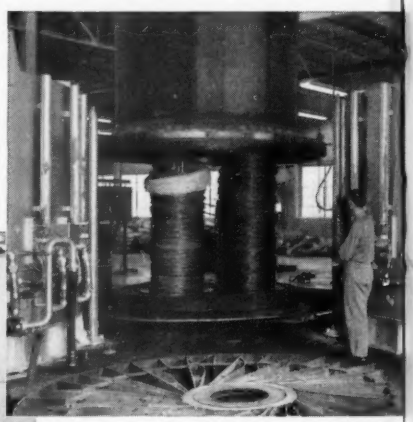
modern production advances in rod and wire processing

EXTRA LARGE CHARGES can be handled in the new Lee Wilson furnaces. With a charge diameter of 114" and a piling height of 108" it is now possible to anneal four large spindles of rod in a single charge.

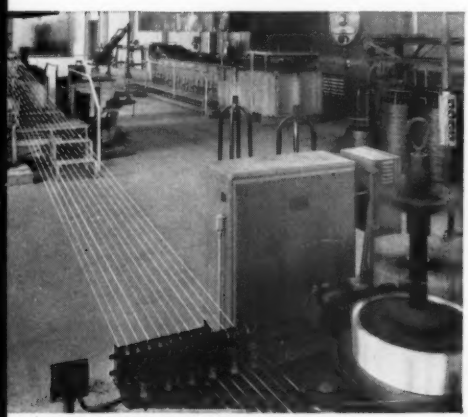


STAINLESS STEEL ROD AND WIRE ANNEALING is performed best in Lee Wilson Bell Type Furnaces. Big producers, like Jones & Laughlin, find they get exacting uniformity of both analysis and structures, charge after charge.

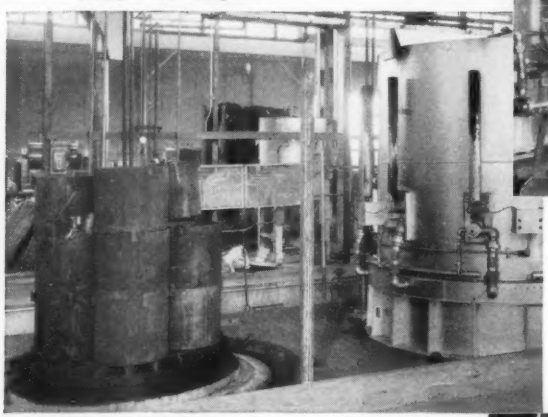
SPEED and FLEXIBILITY are achieved at American Steel and Wire Division of U.S. Steel Corp. through a complete department of large high convection furnaces.



COIL SPHEROIDIZING is performed most efficiently in Lee Wilson Bell Type High Convection furnaces. Lamson & Sessions' Cleveland, O., installation is typical of the spheroidizing operation found in fastener producing plants.



GALVANIZING methods have undergone vast improvement in the past decade. Many leading wire producers, like The Gilbert & Bennet Manufacturing Company, have recently changed to Lee Wilson radiant tube heated lines.



SLUG SPHEROIDIZING furnaces were developed by Lee Wilson for cold extrusion work for the Braun Engineering Co. of Detroit, where uniformity of hardness is an absolute necessity.

HEAVY OIL TEMPERING is now possible at faster speeds and closer camber tolerances since Lee Wilson engineers developed their high speed equipment.

Leading rod and wire mills and product producers have, for more than 25 years, come to rely on Lee Wilson Engineering Co., Inc., for the latest developments in rod and wire annealing, spheroidizing, heat treating, galvanizing and handling equipment. This report on the industry's most advanced methods shows you some of the reasons why.

Literature available on all phases of modern wire annealing, heat treating, galvanizing and handling. To get your copies contact your Lee Wilson sales engineer or write direct to *Lee Wilson Engineering Company, Inc., 20005 Lake Rd., Cleveland 16, O.*

Lee Wilson

"America's Finest Wire Draw"

The newest and finest of readily cleaned lubricants to be used with lime or lime substitutes for rod and wire coatings.

1750 has been mill approved and is in daily use in major mills. It is being used as an additive to many other Standard lubricants for super film strengths and subsequent removal with ease.

"Look to Standard for the Future"

Standard Industrial has pioneered in most of the outstanding contributions to better wire drawing through better lubricants. Consult Standard Industrial for the solution of your difficult problems.

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H. L. Blachford Ltd., 40 Titan Rd., Toronto, Ont.

HOW TEAMWORK RESULTED IN 5 BIG BENEFITS FOR WIRE AND CABLE USERS

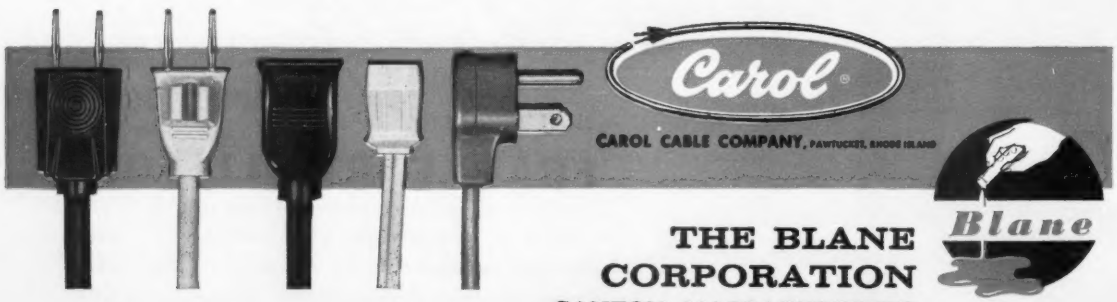
- Color Matching
- Consistency of Repeat Orders
- Plug Matches Cord
- Speed of Development
- Elimination of Flow Marks

Carol Cable Co., Pawtucket, R. I., leading wire and cable manufacturer, approached The Blane Corporation with a problem regarding exact color matching for its cord set materials.

Carol specified that the color match must be absolutely identical despite the fact that the cord is extruded and the plug molded. Carol also wanted assurances that the exacting color match would be maintained on all repeat orders.

Working in cooperation with Carol Engineers, Blane's Color Specialists produced a series of custom colored molding and extrusion compounds. These smooth appearing compounds provided identical color matching which is maintained on all repeat orders. The molding compounds have no flow marks and are streak free. The extrusion compounds provide easy processing and good overall physical properties. Blane's speed of development has also helped Carol to honor its delivery commitments and maintain Carol's fine reputation for quality products and unmatched personal service.

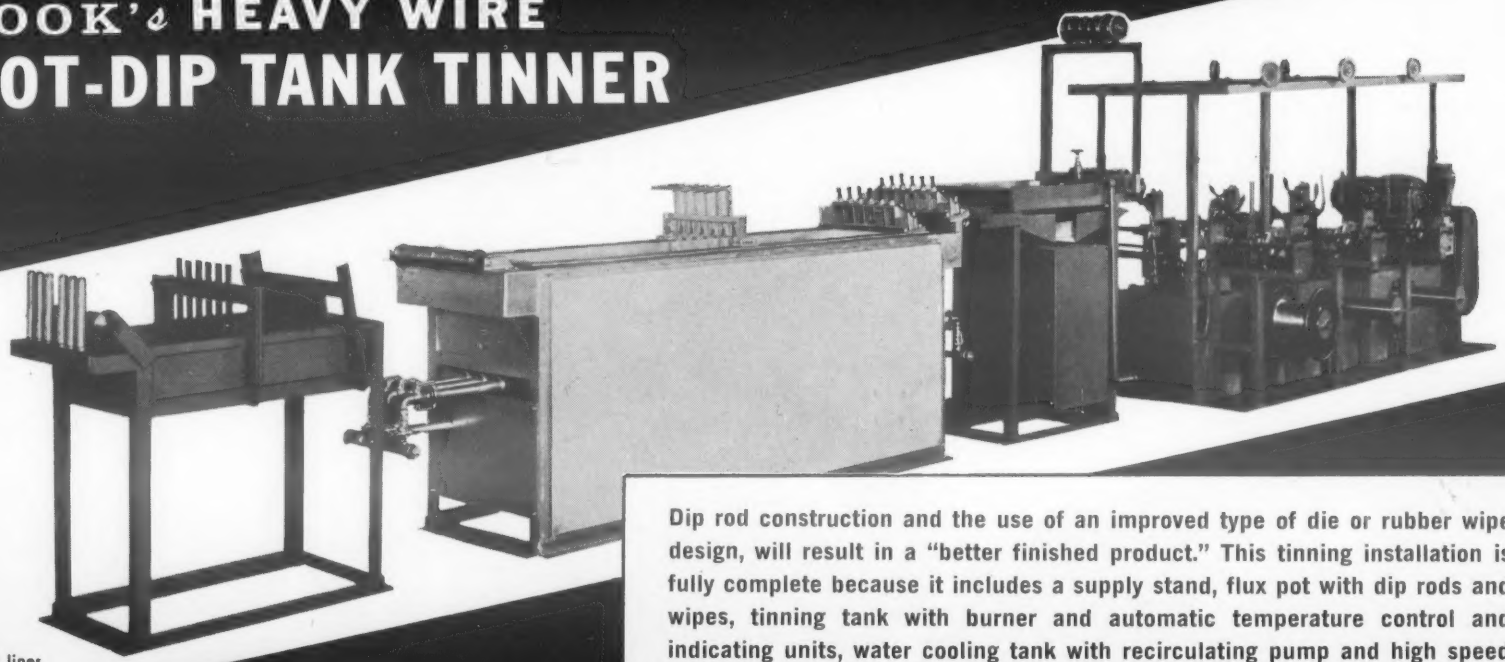
This is another example of Teamwork and industry leadership in action. If you have a problem in the areas of special colors, custom compounds for special requirements, or would like to discuss long term insulation problems or developments, we extend an invitation to contact us. The Blane Man will be pleased to be of service.



THE BLANE CORPORATION
CANTON, MASSACHUSETTS

Now you can produce a **BETTER FINISHED PRODUCT**
and get production up to 3600 feet per minute with*

COOK's HEAVY WIRE
HOT-DIP TANK TINNER



* Using 6 lines of No. 18 wire

Dip rod construction and the use of an improved type of die or rubber wipe design, will result in a "better finished product." This tinning installation is fully complete because it includes a supply stand, flux pot with dip rods and wipes, tinning tank with burner and automatic temperature control and indicating units, water cooling tank with recirculating pump and high speed take-up. Gives wire smooth, perfect uniformity. Flexible in design. Built of rugged, all welded parts. Guarantees up to 600 feet per minute per line speed. Represents a low initial investment for you! And remember, this machine can be custom designed to suit your existing reels or other specialized requirements.

CALL OR WRITE TO

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Manufacturing Company

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West Coast: Thompson Associates, Palos Verdes Estates, California — Canada: E. V. Larson Co., Ltd., Toronto.
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New MORDRAW
vertical wire blocks

LATEST DESIGN FOR COMPETITIVE PRODUCTION

A CHECK LIST OF SUPERIOR FEATURES

Low draft line—eliminates problem of platforms or pits.

High cooling rate—optional systems of air or air and water.

Double-deck individually adjustable die boxes—located on same bracket eliminating need of crossing rod line to thread upper deck. A decided safety feature.

Usable floor space—increased with motor beside gear box.

Quiet operation—worm gear drive.

Easy, quick block changes—with the use of tapered fits.

Built as single- or double-deck machines.

Available in a range of capacities to meet production requirements.

Write for further information.

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MORGAN CONSTRUCTION CO.

WORCESTER, MASSACHUSETTS

ROLLING MILLS · MORGOIL BEARINGS · WIRE DRAWING MACHINES · COMBUSTION CONTROLS

WIRE AND WIRE PRODUCTS*

A monthly publication devoted to the production of Wire, Rod and Strip, Wire and Rod Products and Insulated Wire and Cable.

DRAWING — ROLLING — EXTRUDING — FORMING — FABRICATING

Vol. 36 April, 1961 No. 4

Designated as Official Publication By The Wire Association

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For those small spring wires too tough for pliers, try our #4 TODD cutter.

A really "quality" tool at pliers price!

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Please feel free to consult us with your wire cutting problems.

PAGE Shaped Wire can do a better job for you!

If you use pre-shaped wire—wire with special or unusual cross-sections—PAGE can supply the wire you need, in a wide variety of steels, packaged the way that's best suited to your operations.

PAGE can furnish *any* shape, ranging from the simplest standard shapes to complex "specials." You can specify low carbon, high carbon, alloy or stainless steels, or Armco ingot iron. Strict specifications covering physical properties and size tolerances are no problem at PAGE, the leading special-purpose wire producer. PAGE also offers packaging tailored to your specific requirements.

Most important, you can count on PAGE accuracy and uniformity—regardless of your use of shaped wire.

SEND US A SAMPLE of the shaped wire you use now, with information as to analysis and your tonnage requirements. We'll be glad to recommend a **PAGE** shaped wire to help you reduce your costs or improve your products. For details on PAGE shaped wire, write us at Monessen, Pa., for **Booklet DH-1226**—or for information on the many other manufacturers wire items available from PAGE.

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PAGE *—the source for answers to wire problems*

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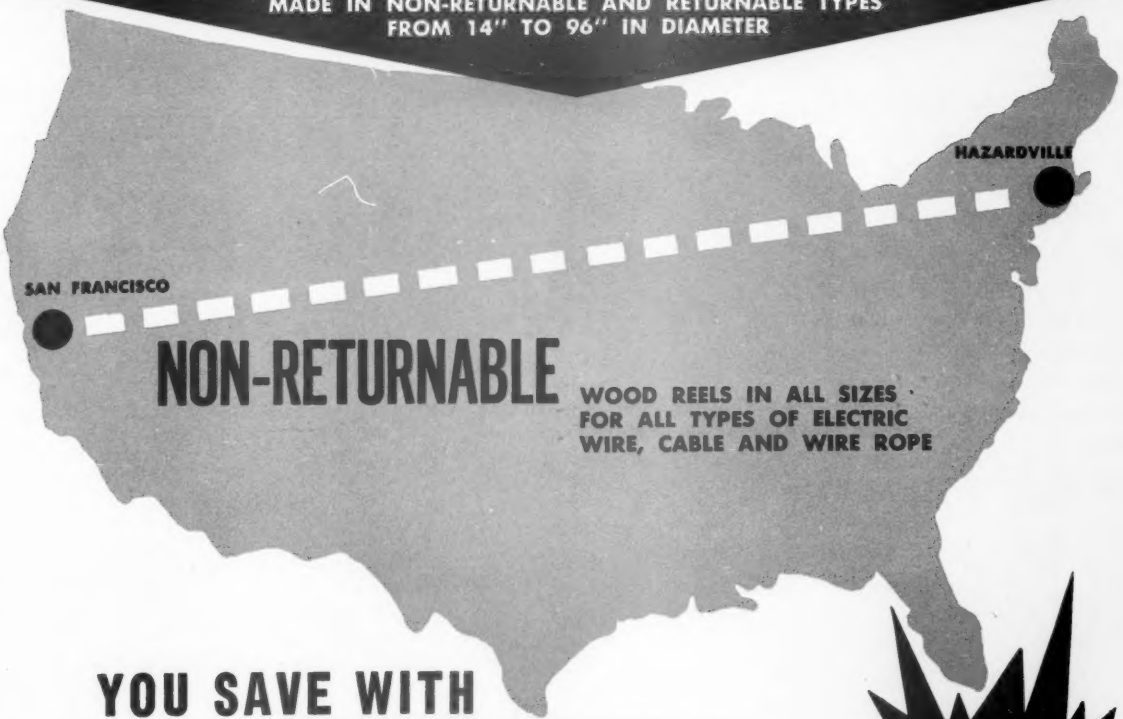
The wood used in the manufacture of BRIDGE REELS, in one average year's production, would make a boardwalk one-inch thick and twelve inches wide stretching over 3,000 miles across the country — OR — it would provide enough lumber to build 3,000 six-room houses — THAT'S QUITE AN OPERATION! The important deduction, however, is that BRIDGE REELS for WIRE, WIRE ROPE and CABLE are good enough to meet the exacting demands of most of the big wire plants of the country.

MADE IN NON-RETURNABLE AND RETURNABLE TYPES FROM 14" TO 96" IN DIAMETER

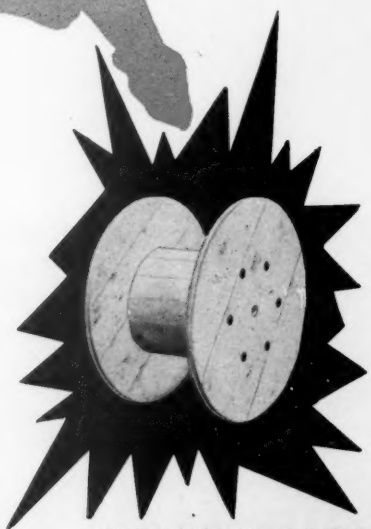


NON-RETURNABLE

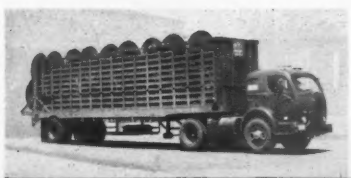
WOOD REELS IN ALL SIZES FOR ALL TYPES OF ELECTRIC WIRE, CABLE AND WIRE ROPE

YOU SAVE WITH NON-RETURNABLES

- Reduced Reel Investment
- Less Storage Space
- Lower Freight Costs
- No Repair Costs
- No Return Freight Charges
- No Bookkeeping
- No Deposits Needed
- No More Headaches!!



NON-RETURNABLE REELS GIVE YOU A DEFINITE PACKAGING COST.



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SHIPPING SERVICE IN OUR OWN TRUCKS

within a radius of 250 miles from the plant. Fast freight will bring you Bridge reels within a few days east of the Mississippi.

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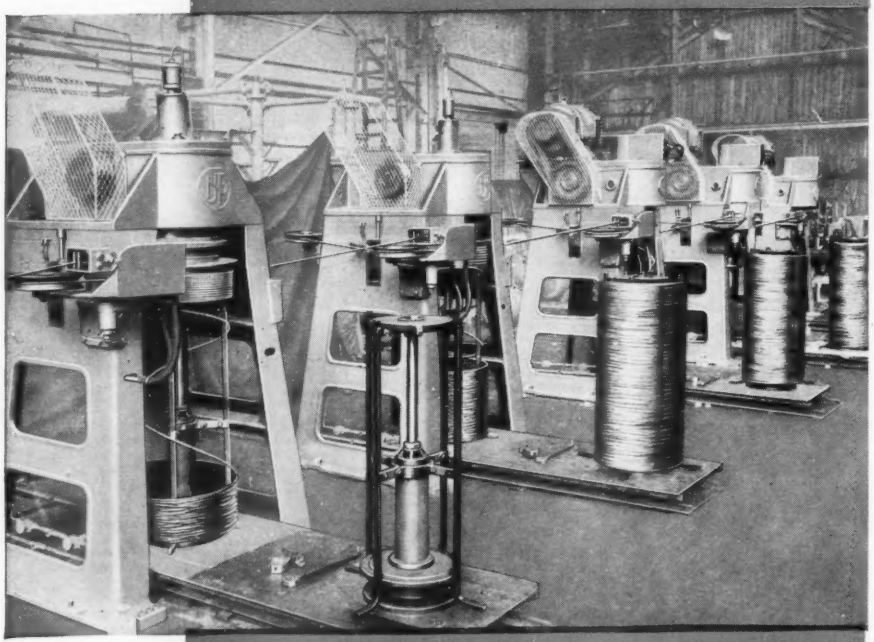
"REEL GOOD . . .

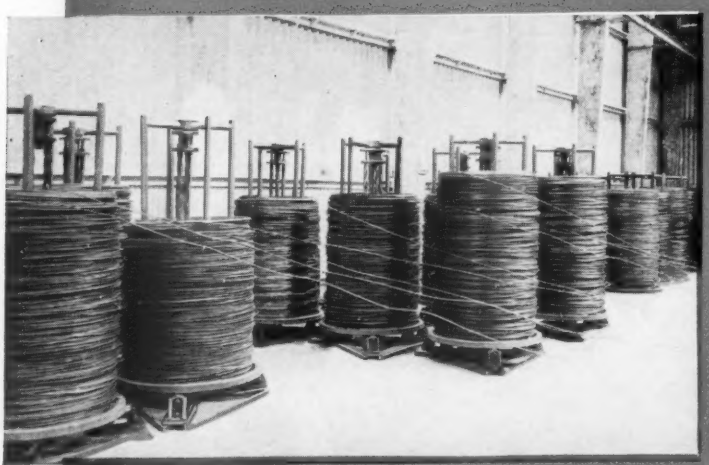
Let us quote on your reel needs. Send us your specifications. Better yet, visit our plant and see how and why Bridge reels are made so well at so low a cost.

WOOD REELS"

Farmer Norton Gravity blocks for handling large coil weights. These can be built for coils up to 2,000 lb or larger. The units can either draw or wind as required. Can be fitted with constant or variable speed motors. DO NOT TWIST THE WIRE. This is essential for Carbon Steel wire. Are built in block sizes from 36" to 12" diameter.



Five Double draft Gravity blocks drawing 15 cwt coils of mild steel wire 5.4 mm to 3.7 mm or Single Draft 5.4 mm to 4.4 mm. Drawing speeds 600 ft/min and 800 ft./min. All five of these blocks are operated by one man.

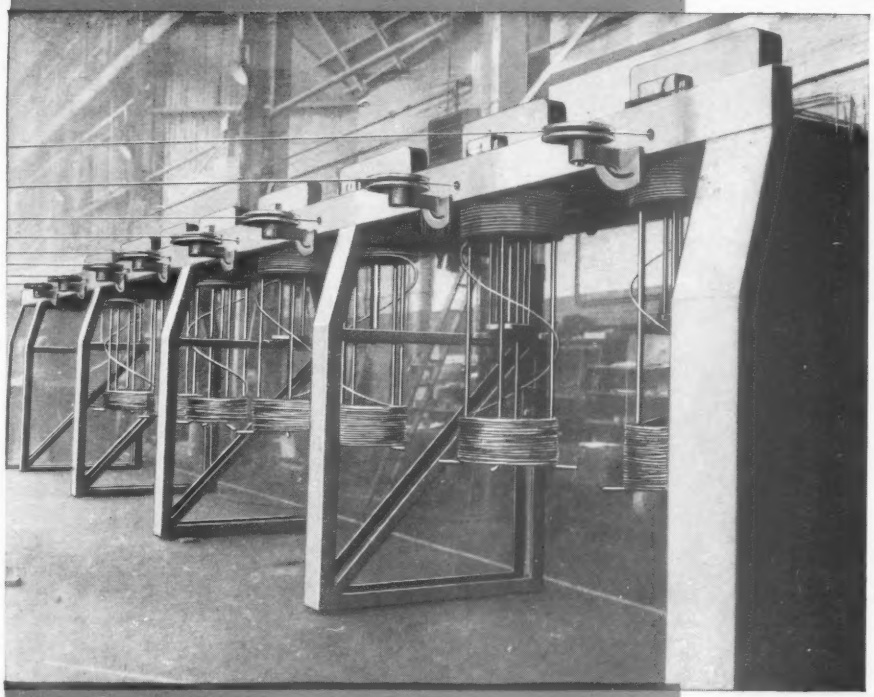


Large coils of this type drawn on Gravity blocks are ideal for feeding cutting machines, nail machines, patenting and galvanising furnaces etc.

SIR JAMES FARMER NORTON & CO. LTD.,

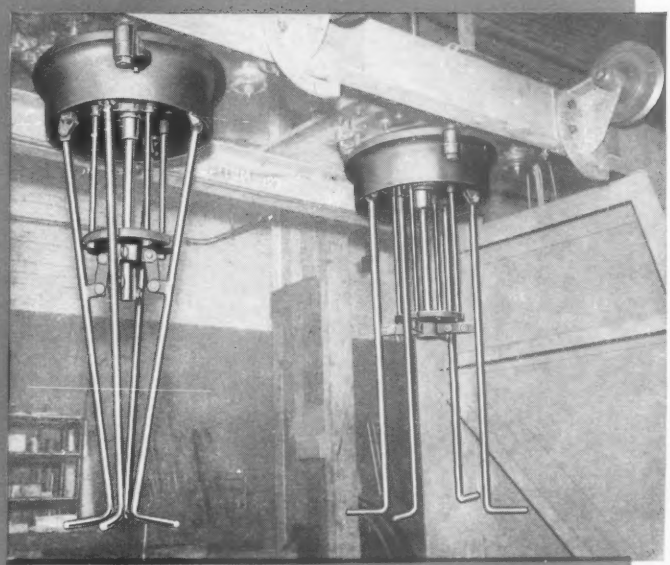
ADELPHI IRONWORKS, ADELPHI STREET, SALFORD 3, ENGLAND. Telephone BLAckfriars 3613/4/5

Agent: Steel & Wire Machinery Inc., 15457 Euclid Avenue, Cleveland 12, Ohio, U.S.A.



Eight head machine for collecting Galvanised wire 5mm - 1.6 mm. in 1,000 lb coils. Drive through variable speed oil gear to give winding speeds of 0 - 150 ft/min. For larger coils up to 2,000 lb a different design of wire collectors is used.

OVER 200 GRAVITY BLOCKS SUPPLIED TO OUR CUSTOMERS THROUGHOUT THE WORLD:—



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Pakistan
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Orders are being executed for U.S.A.

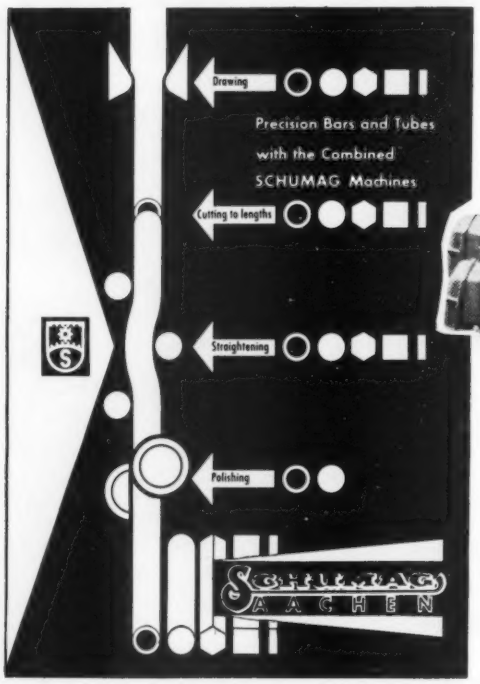
Take up frames for Galvanising, tinning and heat treatment.

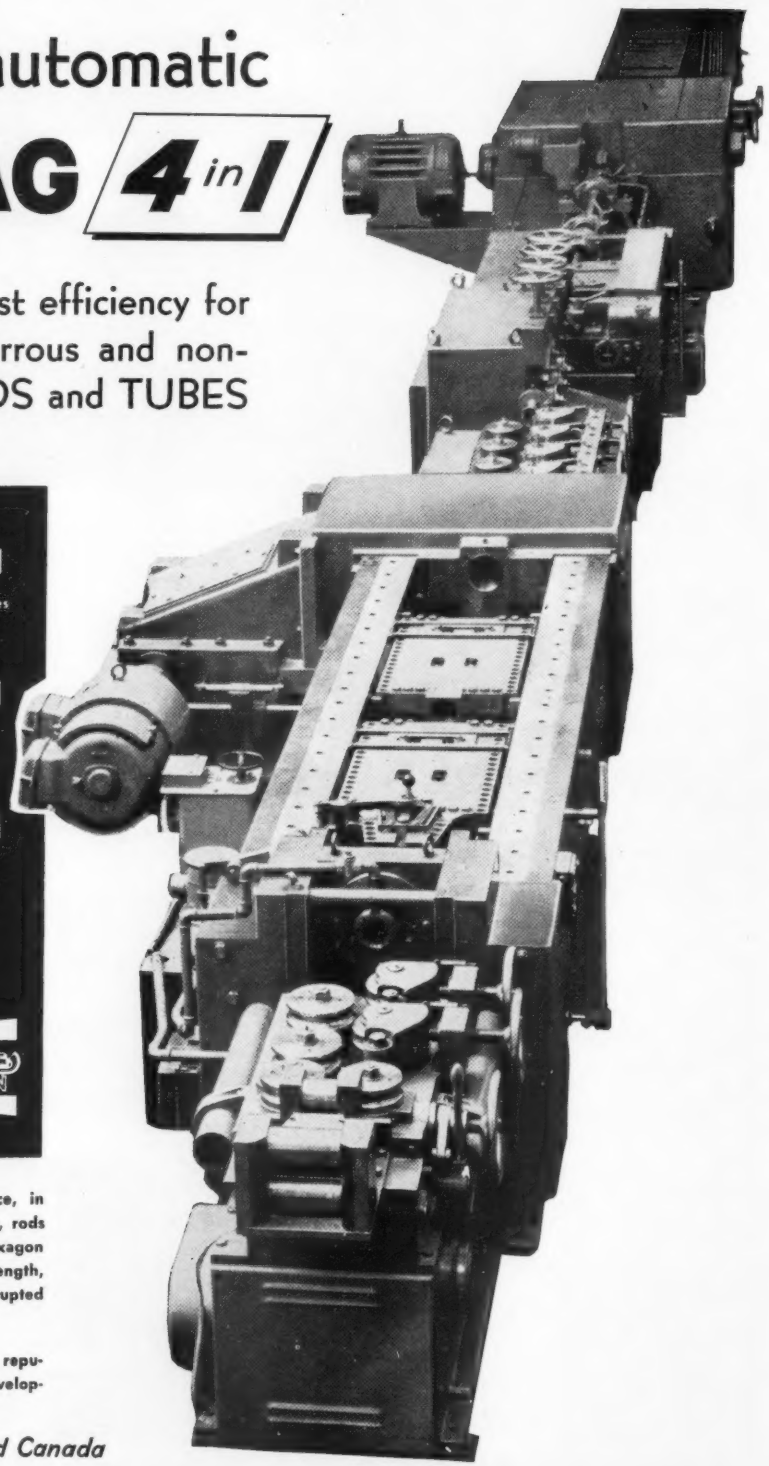
The strippers are collapsed pneumatically.

. . . who are the Inventors and Pioneers of this inverted system of drawing.

The fully automatic
SCHUMAG 4 in 1

ASSURES... greatest efficiency for manufacturers of Ferrous and non-Ferrous BARS, RODS and TUBES





- SCHUMAG "4 in 1" machines produce, in one continuous operation, finished bars, rods and tubes from round, square or hexagon material. They will finish draw, cut-to length, straighten and polish in one uninterrupted sequence.
- SCHUMAG "4 in 1" enjoys world-wide reputation as the ultimate in technical development.

Exclusive Representatives for U.S.A. and Canada

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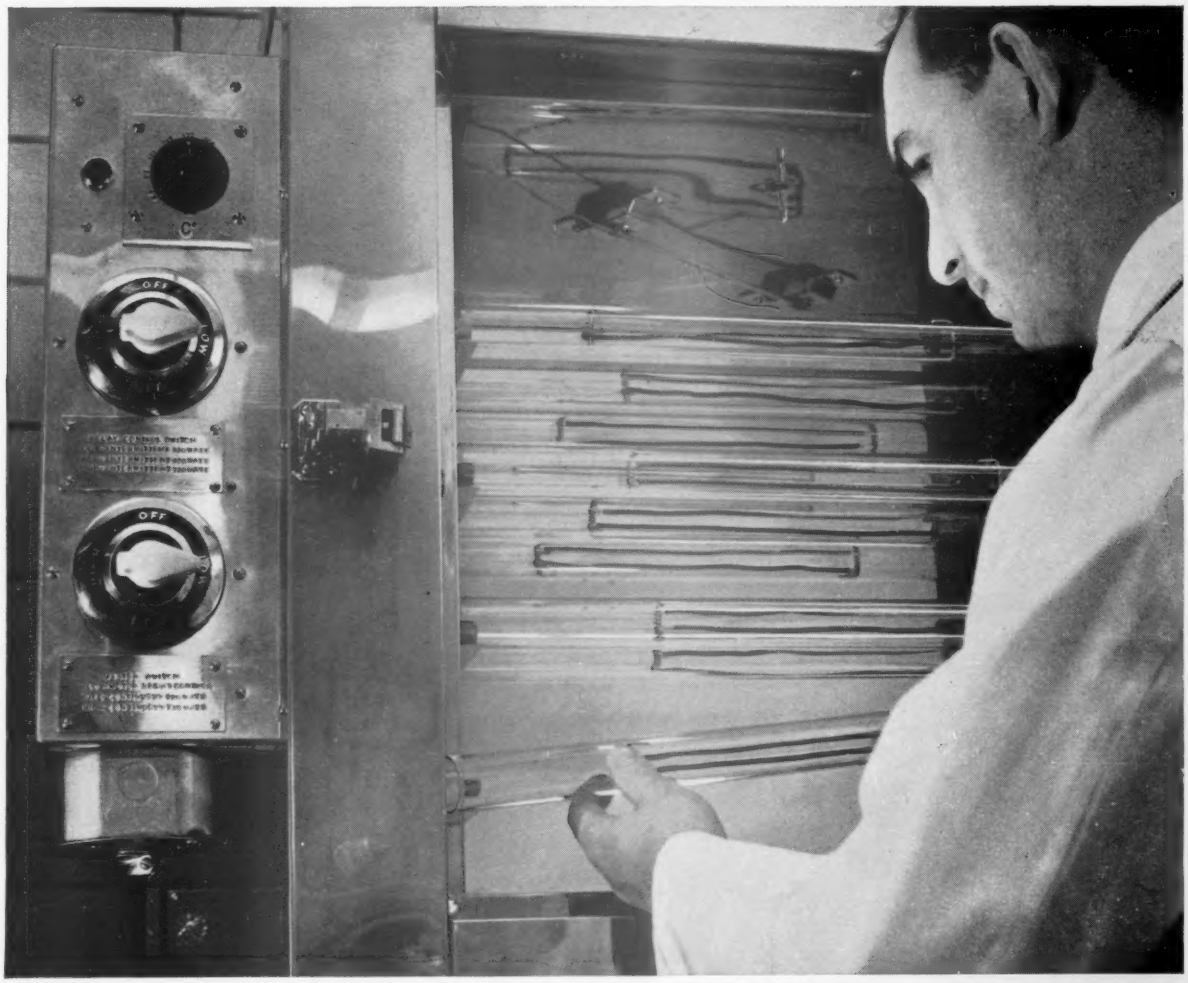
WHAT'S NEWS IN ENJAY TECHNICAL SERVICE



Enjay helps reduce cost of 90°C vinyl wire insulation...

An important part of Enjay Technical Service is developing useful new products that reduce costs, yet maintain performance. Ditridecyl phthalate for use in plasticizing vinyl wire insulation is a good example of this research activity. By tests, such as the oven aging shown above, Enjay was able to prove that DTDP, made from Enjay tridecyl alcohol, performs as an efficient, non-volatile plasticizer for 90°C wire — yet reduces plasticizer cost. Test results, at right, show that the insulation exceeds the U.L. Specifications.

Enjay research facilities and technical skills are available to customers in the vinyl wire, film and sheeting industries.

If you would like to receive a free copy of our new Technical Bulletin No. 20 on Enjay oxo alcohol for plasticizers, write to 15 West 51st Street, New York 19, N. Y.

TEST RESULTS: 7 DAYS @ 121°C

	U. L. Specification Minimum	DTDP Plasticizer
Elongation	65% retention	100% retention
Tensile Strength	65% retention	101% retention
Dielectric Strength	50% retention	127% retention
Insulation Resistance*	.01 megohm based on 1000 ft.	0.36 megohm based on 1000 ft.

* 1 day and 7 days @ 113°C.

EXCITING NEW PRODUCTS THROUGH PETRO-CHEMISTRY

ENJAY CHEMICAL COMPANY

A DIVISION OF HUMBLE OIL & REFINING COMPANY

ENJAY
PETROCHEMICALS

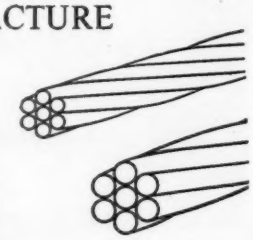
LARGE STRANDS

for prestressed concrete

❀ ❀ ❀

WE ALSO MANUFACTURE

SMALL STRANDS



and plain, indented or crimped wires

RYLANDS

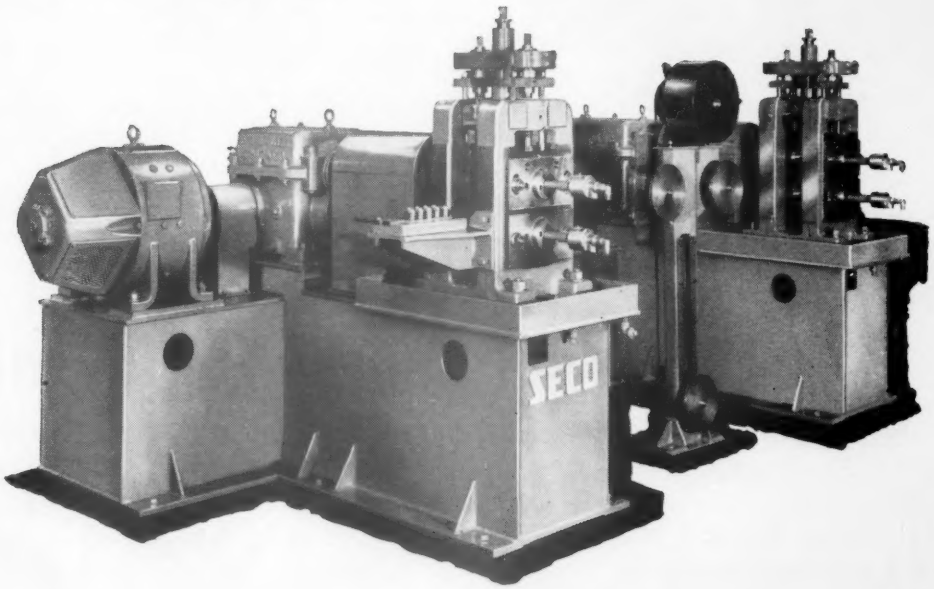
Brothers Limited

WARRINGTON
ENGLAND

Predictable Performance

is yours when you change to

SECO WIRE FLATTENING MILLS



Acceptable and predictable performance "on both sides of the fence" when Seco Wire Flattening Mills are used in your operation.

Seco's staff of trained engineers . . . specialists in solving production problems . . . are available for personal assistance to you. Call us today.

SECO

SECO STEEL MILL EQUIPMENT

- Leveling and Shearing Lines
- Combination Edging and Flattening Lines
- Tension Reels for Strip Polishers
- Narrow Strip Grinding Machines
- Multiple Strand Pull-out Rolls and Take-up Frames
- Strip Coilers (Up and Down Type)
- Traverse Reels for Narrow Strip
- Steel Coil Up-enders
- Scrap Ballers

STEEL EQUIPMENT COMPANY

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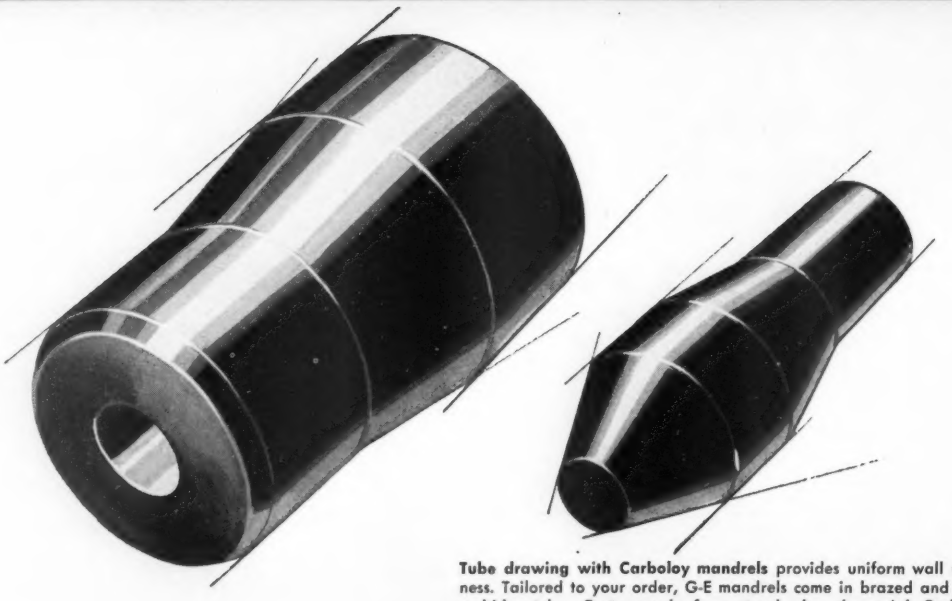
AFFILIATED WITH *Lee Wilson* ENGINEERING CO., INC.

"MOVING METAL" with Carboloy® Cemented Carbides

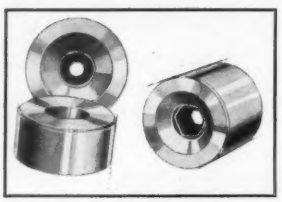


Tube drawing with Carboloy mandrels provides uniform wall thickness. Tailored to your order, G-E mandrels come in brazed and solid carbide styles. Custom-made from standard and special Carboloy nibs. Available from your Authorized Die Distributor or Die Maker.

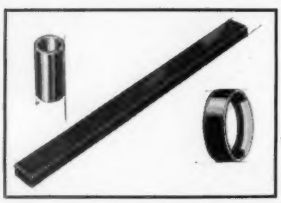
Lower your costs, reduce metal waste with high-quality Carboloy® dies

How efficiently you "*move metal*" from one shape to another depends on the quality, accuracy and uniformity of the carbide you use. General Electric Carboloy carbides for wire, bar, and tube-drawing dies are designed to do the job better at lower cost, and with less metal waste.

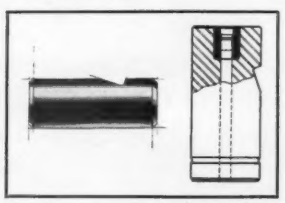
Continuing research by General Electric's experienced metallurgists and technicians results in carbides of highest quality and uniformity — dependability for the job at hand. Call your Carboloy Die Distributor or Die Maker to help you "*move metal*" at lower cost. Or write: *Metallurgical Products Department of General Electric Company, 11171 E. 8 Mile Road Detroit 32, Michigan.*



Get more wire tonnage with uniform size and finish. Carboloy carbide wire, bar and tube dies boost product output, permit longer runs with less die wear, minimize downtime. Available in round, square, hexagon shapes.



Boost wire production schedules by wear-proofing critical parts with G-E carbide wire guide bushings, strips, and guide rings on wire stranding and processing machinery. Last up to 100 times longer than those of other materials.



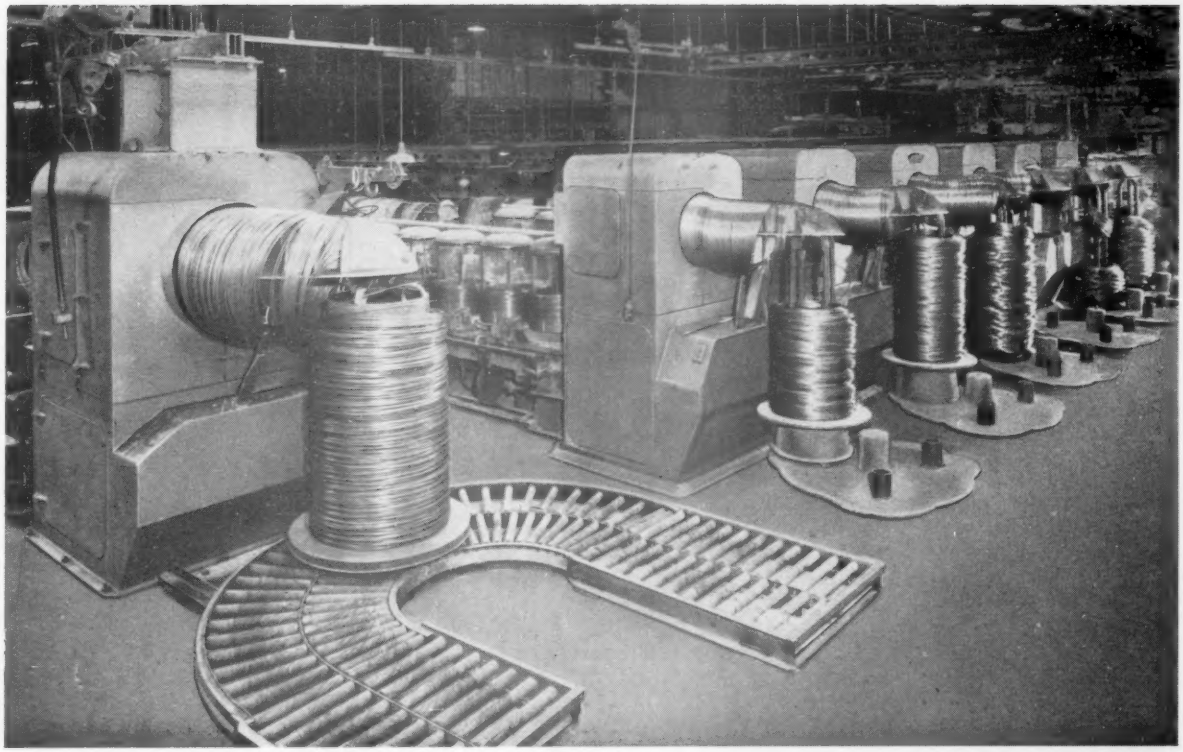
Top quality and performance in boltmaking machinery depend on header and extrusion dies equipped with Carboloy cemented carbides—to produce more uniform parts to closer tolerances; resist stress and strain of heading and extruding operation.

CARBOLOY
CEMENTED CARBIDES

METALLURGICAL PRODUCTS DEPARTMENT

GENERAL ELECTRIC

CARBOLOY® CEMENTED CARBIDES • MAN-MADE DIAMOND • MAGNETIC MATERIALS • THERMISTORS • THYRITE® • VACUUM-MELTED ALLOYS



A portion of Whitacre Wire Drawing Dead Block installations at Sheffield Division of Armco Steel Corp. at Kansas City

FACTS SPEAK LOUDER THAN CLAIMS!

In actual operation Whitacre Wire Drawing Dead Blocks have delivered . . .

40%

Increase in Production

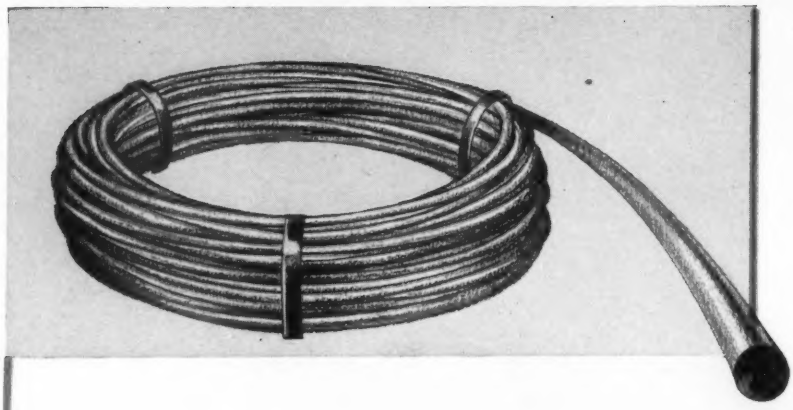
39%

Decrease in Costs!

Let us prove this statement. Investigate today!

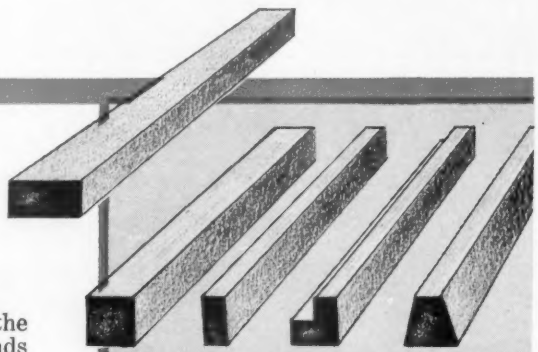
WHITACRE CORPORATION

5649 Alhambra Ave. · Los Angeles 32, Calif. · CApitol 5-2476



For Your Special Requirements Use

EATON-RELIANCE COLD FINISHED STEELS



Eaton-Reliance can furnish shapes in the range of .020″ x .020″ to ½″ x $\frac{9}{16}$″—rounds up through $\frac{11}{16}$″ (coils or bars)—cold rolled, cold drawn special shapes—keystone—centerless ground, finished to your specifications. Produced by the most modern machinery under the most exacting quality control procedures, you can be assured Eaton-Reliance special steels will meet your requirements.

All steel finishing is done in our own mill by experienced craftsmen who draw and roll steel for ball and roller bearings —rings—springs—keys—pins and cold heading. Countless sections are available including round, square, flat, rectangular, step section, keystone and hex.

Eaton-Reliance also cold finishes several non-ferrous metals in addition to carbon, stainless and alloy steels.

Write for our 8-page catalog containing information about Eaton-Reliance cold finished steels and non-ferrous metals. No obligation.

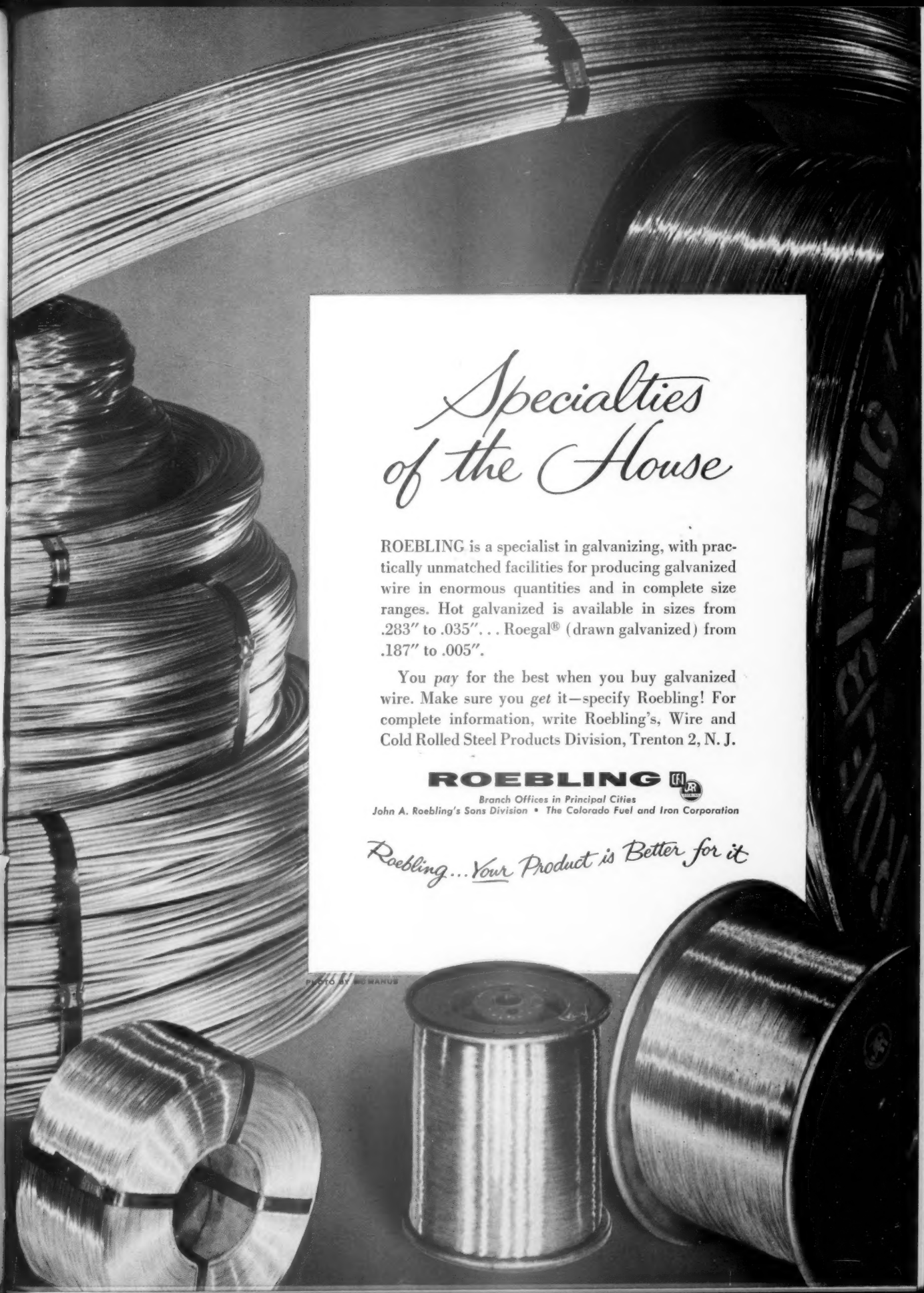
EATON

RELIANCE DIVISION

MANUFACTURING COMPANY

510 CHARLES AVENUE • MASSILLON, OHIO

SALES OFFICES: New York Cleveland • Detroit • Chicago • St. Louis • San Francisco • Los Angeles



Specialties of the House

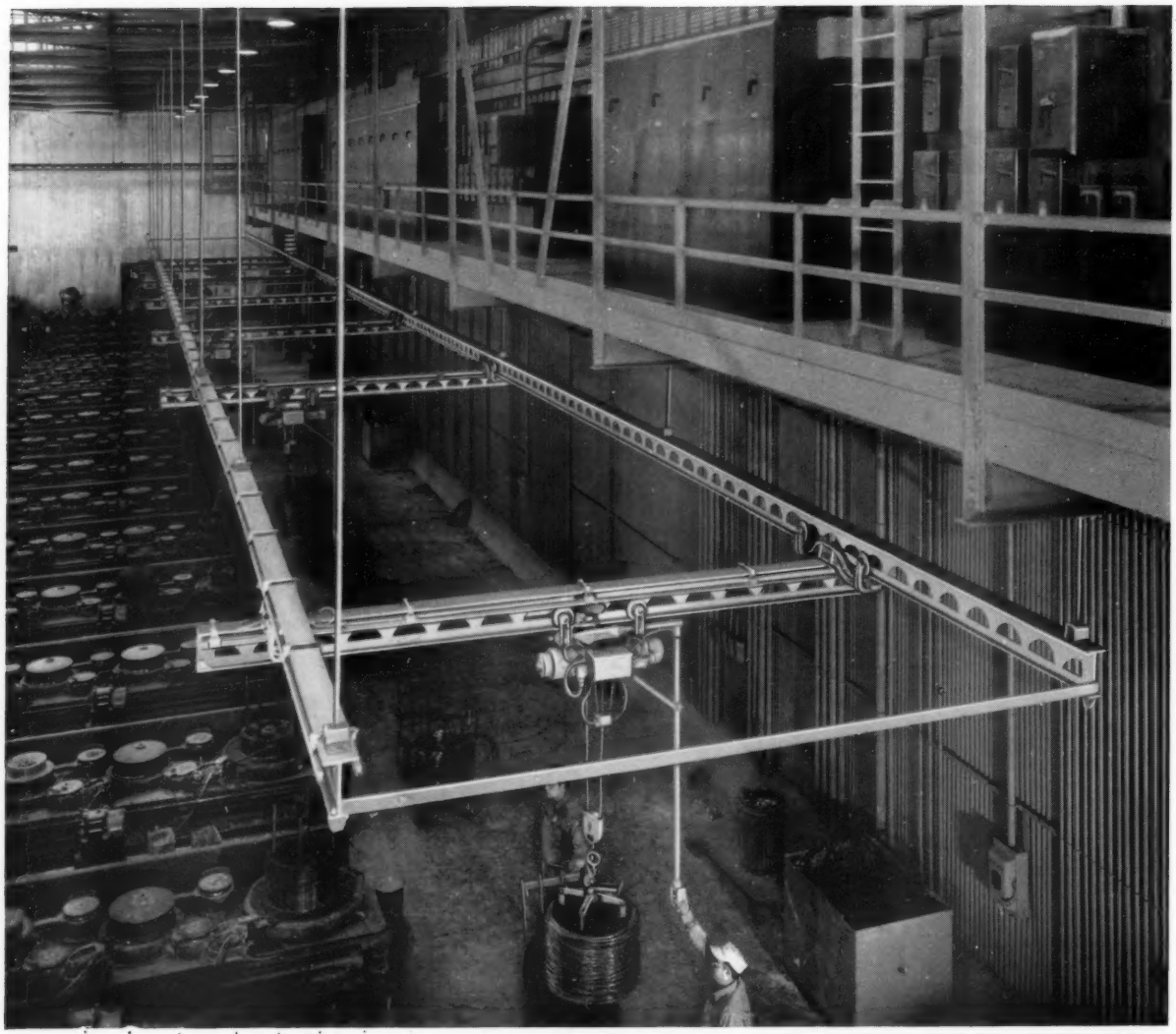
ROEBLING is a specialist in galvanizing, with practically unmatched facilities for producing galvanized wire in enormous quantities and in complete size ranges. Hot galvanized is available in sizes from .283″ to .035″. . . Roegal® (drawn galvanized) from .187″ to .005″.

You *pay* for the best when you buy galvanized wire. Make sure you *get* it—specify Roebling! For complete information, write Roebling's, Wire and Cold Rolled Steel Products Division, Trenton 2, N. J.

ROEBLING

Branch Offices in Principal Cities
John A. Roebling's Sons Division • The Colorado Fuel and Iron Corporation

Roebling... Your Product is Better for it



This installation consisting of seven hand-propelled cranes on a flexibly suspended runway is used for stripping wire blocks in a large steel mill. Note how easy it is with the Cleveland Tramrail design to position the runway at any level or location desired. Likewise, it is extremely simple to dismantle and relocate the equipment to serve some other application, should such ever be necessary.

FLEXIBLE SUSPENSION

Assures Smooth Crane Operation

CLEVELAND Tramrail's unique flexible suspension method of supporting crane runways prevents binding of wheels on the tracks and assures smooth easy rolling operation, regardless of location of the load on a crane bridge.

The floating runways compensate automatically for normal skewing or twisting of crane bridges.

This is one of the reasons why hand-propelled Cleveland Tramrail cranes can be used for so many jobs where motor-driven cranes would otherwise be required.

Operation is so easy that Cleveland Tramrail guarantees a starting effort of 15 lbs. and running effort of 10 lbs. per ton weight.

Write for free copy of illustrated booklet No. 2008, "Engineering and Application Data".

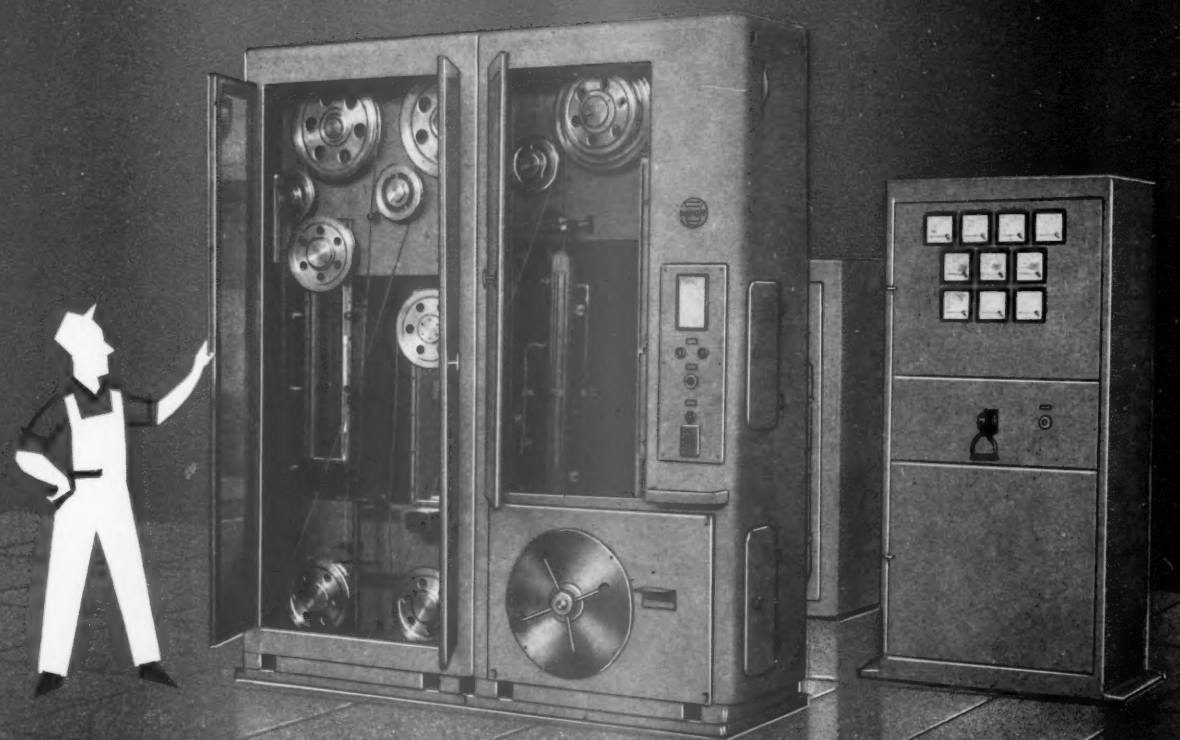
CLEVELAND TRAMRAIL

Overhead Materials Handling Equipment

CLEVELAND TRAMRAIL DIVISION • THE CLEVELAND CRANE & ENGINEERING CO • 9212 EAST 290 STREET • WICKLIFFE, OHIO

NEW DEVELOPMENTS CONTINUE!

Large Continuous Electric Annealer VG 85 to be worked in combination with any copper rod break down machine, for bright annealed finished wire, for sizes between .14" and .048". Finishing Speeds up to 3000 to 4000 ft/min.



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FISK BLDG. 250 WEST 57th STREET
NEW YORK 19, N.Y.

EXCLUSIVE REPRESENTATIVES FOR U.S.A. AND CANADA

NIEHOFF MACHINE WORKS

SCHWABACH NEAR NURNBERG WESTERN GERMANY

Quality plus economy when you buy SUMITOMO steel wire rods

Rapid developments in the wire-product field have increased industry's demand for top-quality steel wire rods. Because of its international reputation for reliability, Sumitomo Metal supplies world markets — America in particular — with 7,000 tons of wire rods every month. To keep up with this export demand, Sumitomo Metal has added to its present facilities another new wire rod mill, completely equipped with the most modern machinery available.

Dimensions of Sumitomo Wire Rods

Diameter 5mm. (13/64″) — 16mm. (5/8″)

Weight Single Bundle
about 270 kgs. — 320 kgs.
600 lbs. — 700 lbs.
Compressed Bundle (6 coils)
about 1,620 kgs. — 1,920 kgs.
3,600 lbs. — 4,200 lbs.

Coil Dimensions on Request

LEADING PRODUCERS OF STEEL WIRE RODS, PIPE AND ROLLING STOCK PARTS

SUMITOMO METAL INDUSTRIES, LTD.

Head Office: Osaka, Japan
Cable Address: "SUMITOMOMETAL OSAKA"

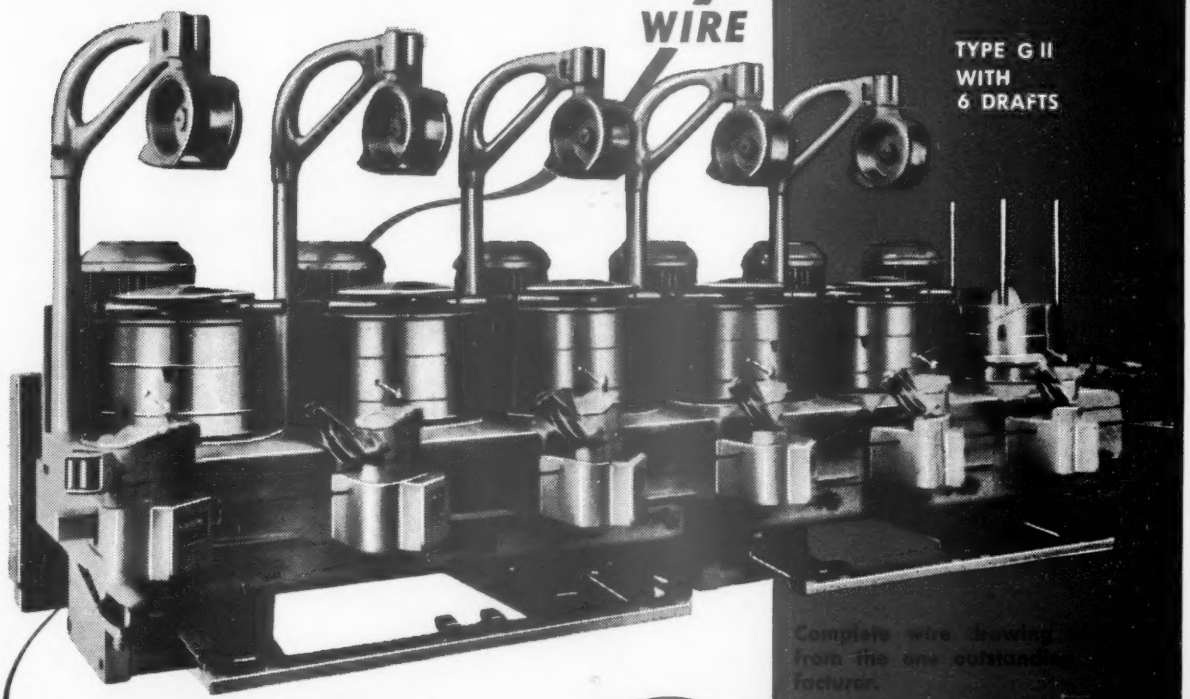
New York Office: 420 Lexington Ave., New York 17, N.Y.
Cable Address: "SUMITMETAL NEWYORK"

HERBORN

WIRE DRAWING MACHINES

NON-SLIP MULTIPLE OPERATION

FOR BASIC and CARBON STEEL WIRE



TYPE G II
WITH
6 DRAFTS

This is the Herborn Type G II non-slip multiple wire drawing machine with 5 drawing blocks 18" diameter and a finishing block of 20" or 24" diameter.

- *Each block has individual motor and drive with 2, 3 or 6 speeds.*
- *Water-cooled system, for blocks and die holders*
- *Precision ground helical teeth gears for smooth running.*
- *Smooth, slow-starting arrangement over a transformer.*
- *Emergency stop system, plus other safety features.*
- *The machine can be constructed as six separate, individual units which can be operated as single blocks, or in tandem as a 6 block unit.*

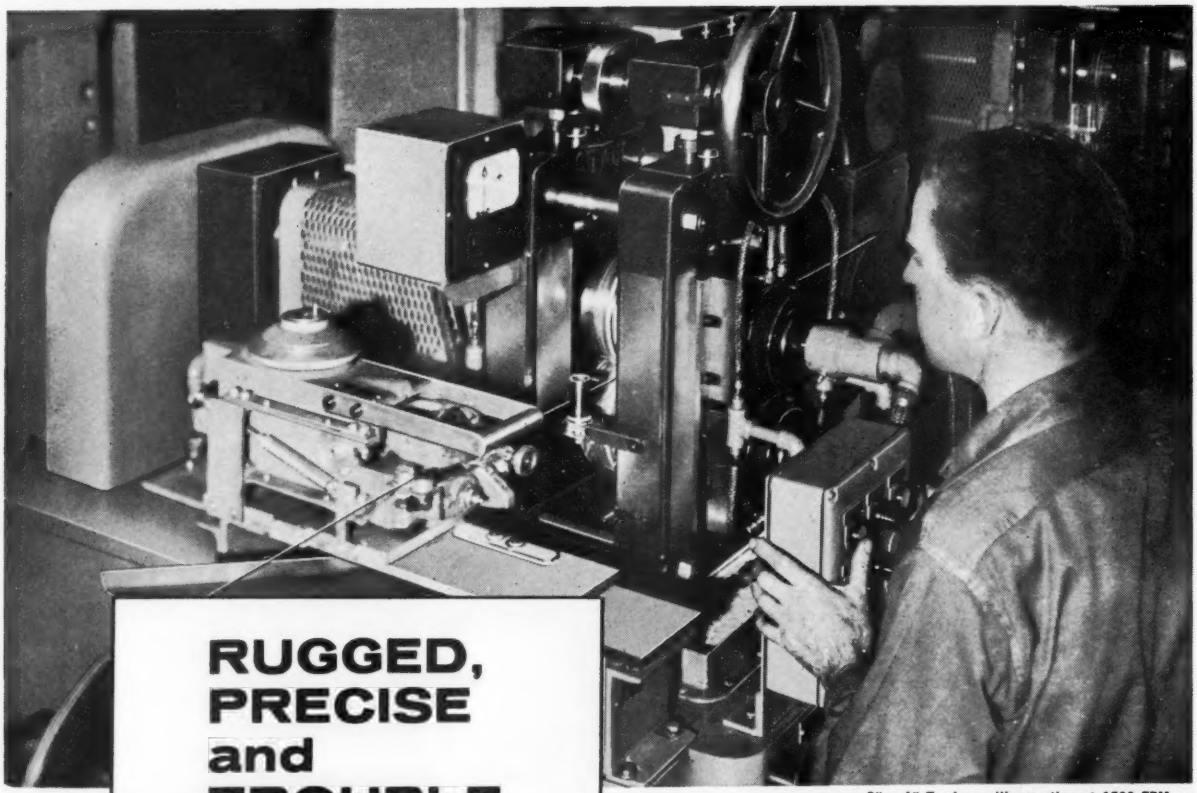
Complete wire drawing from the one outstanding manufacturer.

Economical Operation—[illegible] features than any other at twice the price.

Pay for themselves quickly [illegible] increased production, [illegible] of downtime, and superior products at lower cost.

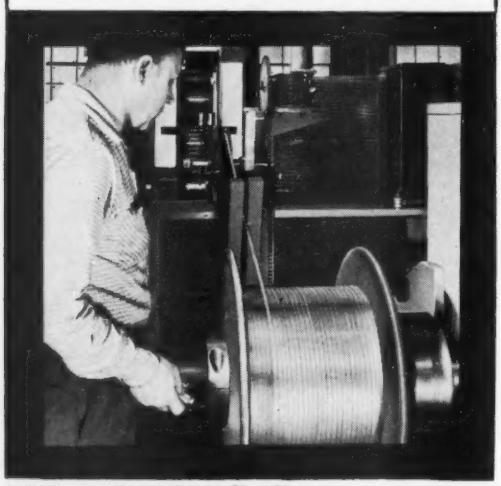
For complete information, write to:

HERBORN MACHINERY CORP.
61 HUDSON STREET, HACKENSACK, NEW JERSEY
Maschinenfabrik Herborn - Berkenhoff & Drebes A.-G.
Herborn/Dillkreis (Germany)



6" x 4" Tandem mill operating at 1500 FPM on high carbon steel at Page Steel Division—ACCO.

RUGGED, PRECISE and TROUBLE FREE



1000 lb. traversing recoiler on 8" x 5" tandem line at Kagan Dixon Wire Corp.

STANAT WIRE FLATTENING MILLS

Stanat mills are designed to consistently give you extremely close tolerances combined with high speed production.

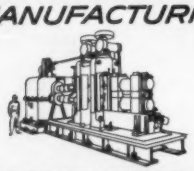
Simplicity of design insures minimum maintenance and frequently permits one man operation.

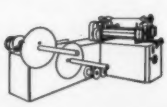
All Stanat mills include such quality features as completely enclosed permanently lubricated worm gear screwdowns; fully adjustable traversing recoiler; herringbone drive; anti-friction bearings at all critical wear points.

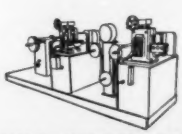
Stanat single and tandem wire flattening mills are available in sizes up to 10" roll diameter either as completely self-contained package units or as individual components for erection at your plant.

STANAT
MANUFACTURING CO., INC.

500 SHAMES DRIVE WESTBURY, L. I., N.Y.
IN EUROPE: STANAT-MANN, ESSEX, ENGLAND

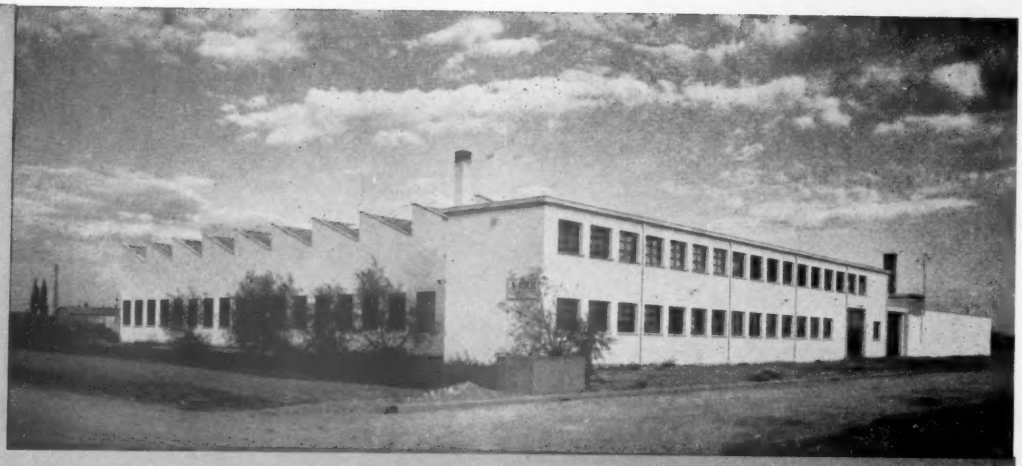




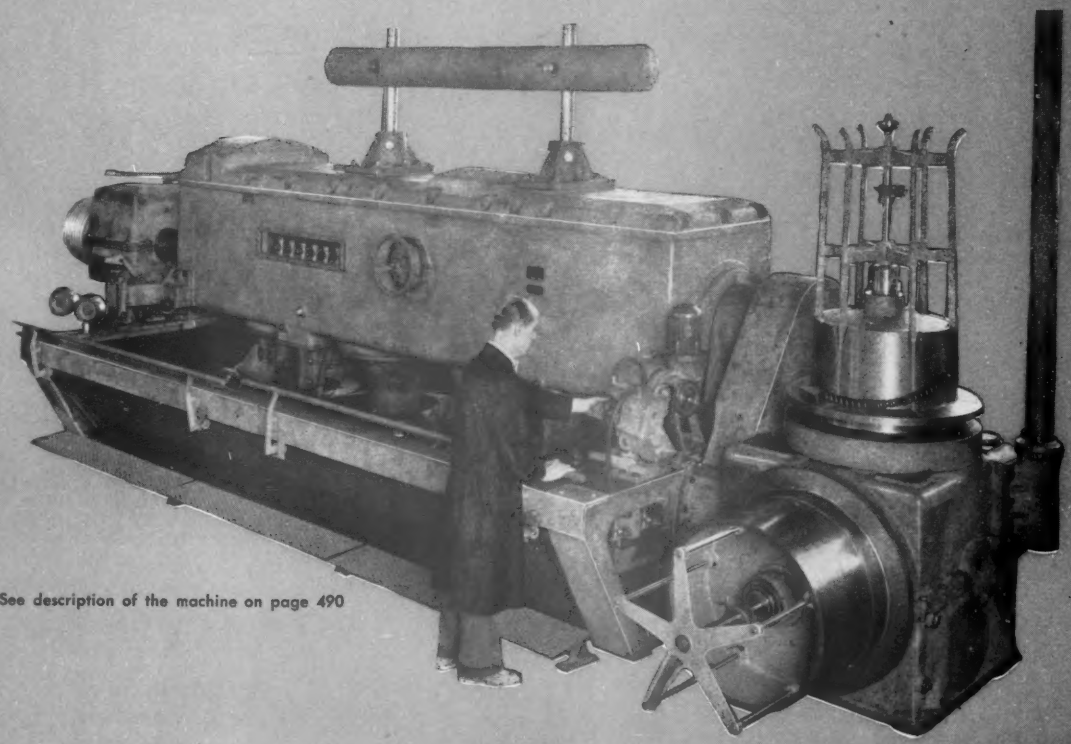


MFR'S OF ROLLING MILLS, GANG SLITTERS, WIRE FLATTENING MILLS, ROLLER LEVELERS AND BULL BLOCKS

"SAMP"



Multiwire drawing machine – UNIVERSAL model MM-1/T
for drawing Trolley wires etc.



See description of the machine on page 490

Soc. p. Azioni
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You'll Find Yawata's Steel Wire Rods Everywhere

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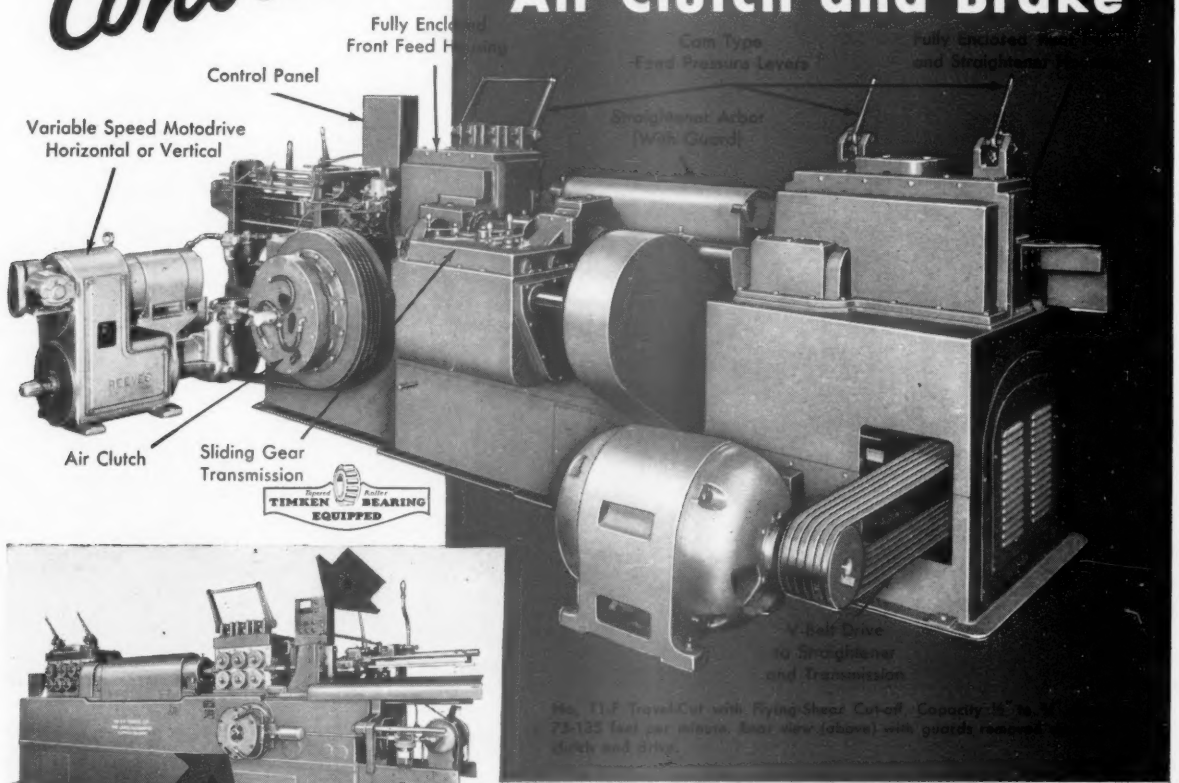
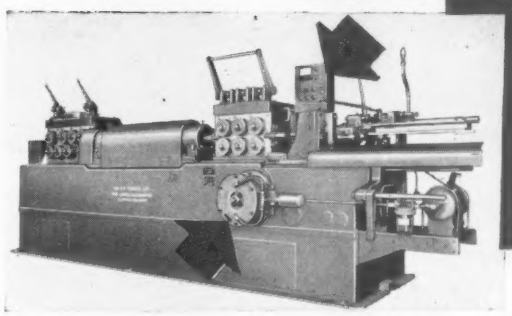
Better Quality Control ✳

LEWIS

Wire Straightening and Cutting Machines with Air Clutch and Brake





Front view of No. 11-F Travel-Cut with Flying Shear Cut-off showing Air Brake "A" (with guard removed) and operating panel "B" with push-button controls for Air Clutch, Reeves Motodrive and flywheel speed Indicator Tachometer.

● Lewis engineers have added three important improvements to their famous Travel-Cut Machines for BETTER QUALITY CONTROL . . . These machines are already in service in America's leading steel and wire mills.

✳ Wichita Air Clutch permits higher cut-off speeds, eliminates shock of conventional clutch. No adjustment necessary . . . automatically compensates for wear.

✳ Wichita Air Brake eliminates conventional mechanical drag brake and is only engaged for a short portion of the cut-off cycle.

✳ Reeves Variable Speed Motodrive permits infinite adjustment of flywheel speed for perfect synchronization of the cut-off and wire feed speeds. This unique arrangement makes possible the cutting of rod WITHOUT SPOT SWELL . . . allows finer adjustment for cutting short lengths. Dial tachometer registers flywheel speed.

There are Standard Lewis Travel-Cut or Stationary-Cut Machines designed to straighten and cut all materials and shapes in wire or rod from .012" to 1" at a wide range of feed speeds.

Air Clutch available on all Travel-Cut Models. Send for new brochure showing complete line of Lewis Wire Straightening and Cutting Machines.

LEWIS MACHINE COMPANY 3440 East 76th Street Cleveland 27, Ohio

Of all steel-wire manufacturers, *only* CF&I offers you high quality steel wire in all the packages shown above. These packages are designed to help you cut downtime . . . ease storage and handling problems . . . and increase daily production.

1. FIBRE DRUMS – 250-600 lbs. capacity. A sturdy container, with a center core, which holds wire of one continuous length. A metal cover and locking band seal the drum and protect the wire from atmosphere and dirt. Wire is withdrawn directly from the drum into your equipment. Two sizes: full and half drum.

2. SHAPED COILS – 1500-2500 lbs. capacity. This heavy coil contains wire of one continuous length, bundled with four steel straps. Will increase production up to 25%.

3. REEL-LESS CORE – 800-1000 lbs. capacity. Reduces shipping expense by eliminating deposit on reels and cost of returning empty metal reels. One continuous length is wound on a cardboard core. When received at your plant, the wire is placed on your aluminum, detachable-flange reel . . . ready for use.

4. RETURNABLE SPIDERS – 2000-3000 lbs. capacity. A sturdy wire carrier consisting of a center core of 2″ steel pipes welded to a heavy base plate. Holds one continuous length of wire, reduces downtime and increases production.

5. DISPOSABLE SPOOLS – 5-70 lbs. capacity. Can be used once and then discarded. Has the advantage of wire on spools with no deposit, no return of empty spools.

6. DISPOSABLE STEM-PAKS® – 500-1000 lbs. capacity. One continuous length of wire on a disposable pallet consisting of a center core attached to a wooden base mounted on 4″ runners. Speeds unloading, handling and increases production.

7. RETURNABLE STEEL REELS – 500-800 lbs. capacity. Holds one continuous length of wire, ready for smooth, even pay-off. Assures you wire free from damage in transit. Because reels require

offers you all ten!

less pay-off space, valuable production area can be saved.

8. WOODEN RACKS – 1500-3000 lbs. capacity. Protects coils during shipping and simplifies in-plant handling. Eliminates need for handling individual coils.

9. SPOOL-LESS BLACK-SATIN PAKS – 2000 lbs. capacity. Provides two 1000 lb. continuous lengths of oil tempered wire wound on cardboard cores, palletized and shrouded with polyethylene. Ideal for long production runs. Cuts downtime up to 90%.

10. STANDARD COILS—100-600 lbs. capacity. Packaged for a wide range of industrial uses. They are securely bundled and can be paper-wrapped for protection in transit and storage.

• • •

For more complete information on each of these ten wire packages, we invite you to consult your CF&I sales office. 8119

THE COLORADO FUEL AND IRON CORPORATION
Denver • Oakland • New York
Sales Offices in All Key Cities

MEETING OF THE ELECTRIC WIRE AND CABLE SECTION OF THE WIRE ASSOCIATION

April 27-28, 1961, Sheraton-Atlantic Hotel, New York, N. Y.

THE PROGRAM

April 26, 10 A.M.—Meeting of Board of Directors of The Wire Association. 1st Mezzanine
2 P.M.—Meeting of Electric Wire & Cable Management Committee. 1st Mezzanine.
12 M.-7 P.M.—Registration Desk open on the 1st Mezzanine.

April 27, 8 A.M.—Registration, 24th Floor.
10 A.M.—Ladies Get-Acquainted Coffee Hour—followed by trip to point of interest and luncheon. Meeting is on 1st Mezzanine Floor.
10:30 A.M. — Busses leave hotel for Plant Inspection Tour of Bell Telephone Laboratories at Murray Hill, N. J. Luncheon there as guests of the Laboratories. All visitors must go by bus; no private cars allowed. Busses start return at 4 P.M. See page 485.
6 P.M.—Hospitality Hour. Ladies welcome. 24th Floor.

April 28, 8 A.M.—Registration, 24th Floor.
9 A.M.—Technical Session, Grand Ballroom, 24th Floor.

MODERATOR: Richard Bliss, Vice Pres., Mohawk Development Service, Inc., Schenectady, N. Y.

PAPER: "Silicone Rubber Insulated Wire and Cable", by J. P. Harrington, Rubber Market Development, Silicone Products Div., General Electric Co., Waterford, N. Y.

PAPER: "Wire Insulating by the Fluidized Bed Process", by C. A. Brown, Engineering Research Center, Western Electric Co., Princeton, N. J.

PAPER: "The Vacuum Hopper in the Extrusion of Electrical Insulation Using PVC Dry Blends", by Neil C. Flathers, Robert E. Johnson, Vernon R. Pallas and Dr. W. Mayo Smith, Research Center, Escambia Chemical Corp., Wilton, Conn.

PAPER: "Application of Treated Papers in Filling Electrical Cables," by R. L. D. Aigler, Plymkraft Div., Plymouth Co., Plymouth, Mass

PAPER: "Extruded Cellular Vinyl", by Andrew D. Varenelli, Senior Research Specialist, Naugatuck Chemical Div., United States Rubber Co., Naugatuck, Conn.

1:30 P.M.—Technical Session, Continued, Grand Ballroom, 24th Floor.

MODERATOR: J. E. Thomas, Mfg. Supt., Phillips Electrical Co. Ltd., Brockville, Ont., Canada.

PAPER: "Establishing a Tape Standardization Program", by Robert W. Pallett, Electrical Wire Div., John A. Roebling's Sons Div., The Colorado Fuel & Iron Corp., Trenton, N. J.

PAPER: "Cable Stranding", by Lester O. Reichelt, Western Electric Co., Chicago, Ill.

PAPER: "Melt Elastic Extruder"—by A. J. Scalora, Chief, Plastics Res. & Devel., and C. E. Plymale, Group Leader, Owens-Illinois Glass Co., Toledo, Ohio.

PAPER: "Modernized Enameling and Packaging Procedures", by Fred J. Bieber, Pres., Acrometal Products, Inc., Minneapolis, Minn.

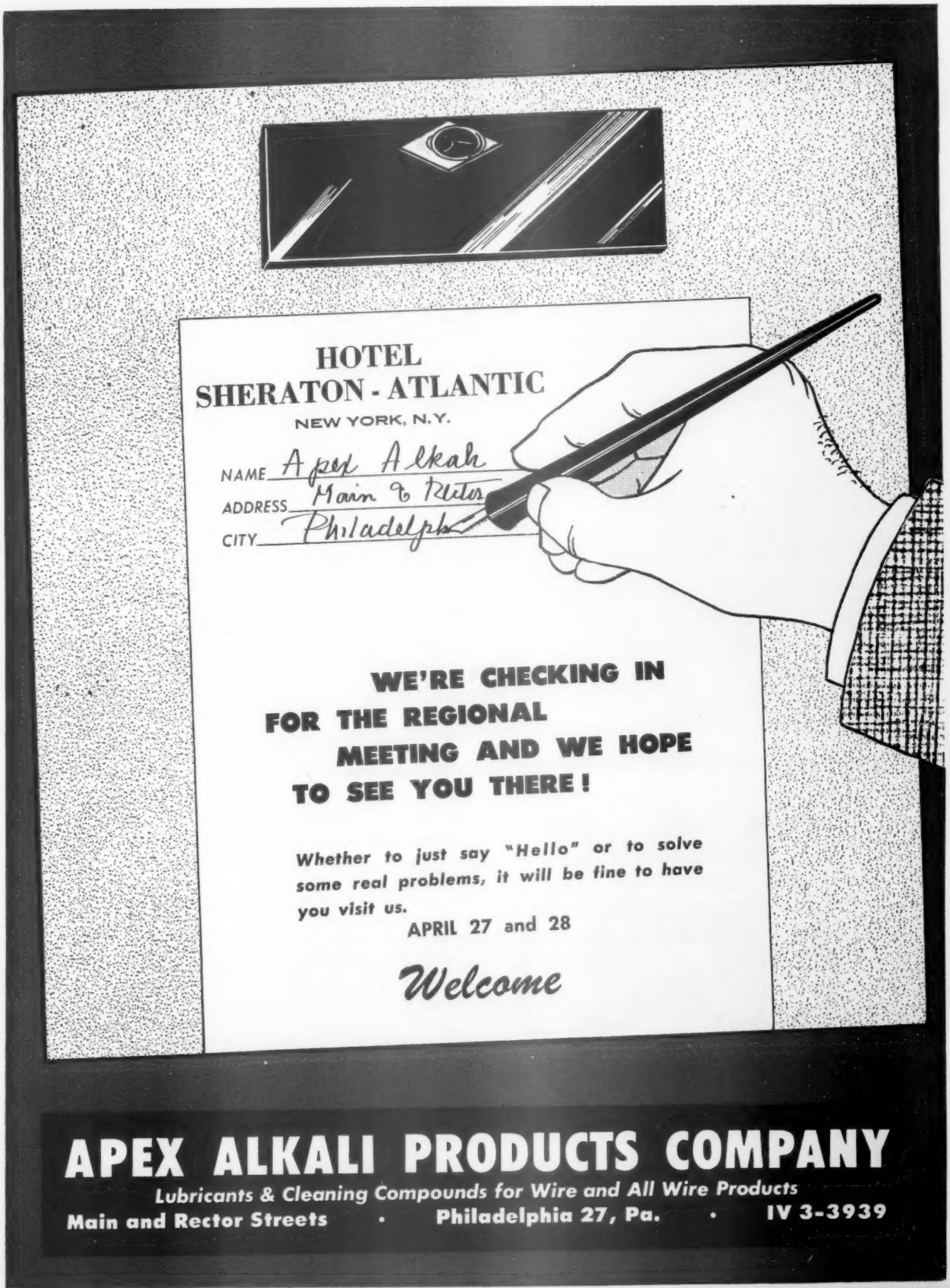
This meeting is an important one for all men concerned with production problems in the manufacture of Electric Wire and Cable and all are cordially invited to attend.

If you are not a member of the Association and would like hotel accommodations, write or 'phone for a hotel reservation card. Association members receive their hotel cards by mail. Be sure to attend this meeting!

THE WIRE ASSOCIATION

RICHARD E. BROWN, Executive Secretary
Tel.: DAvis 3-0482

453 MAIN STREET ● **STAMFORD, CONN.**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FOR THE REGIONAL
MEETING AND WE HOPE
TO SEE YOU THERE!
Whether to just say "Hello" or to solve some real problems, it will be fine to have you visit us.
APRIL 27 and 28
Welcome
APEX ALKALI PRODUCTS COMPANY
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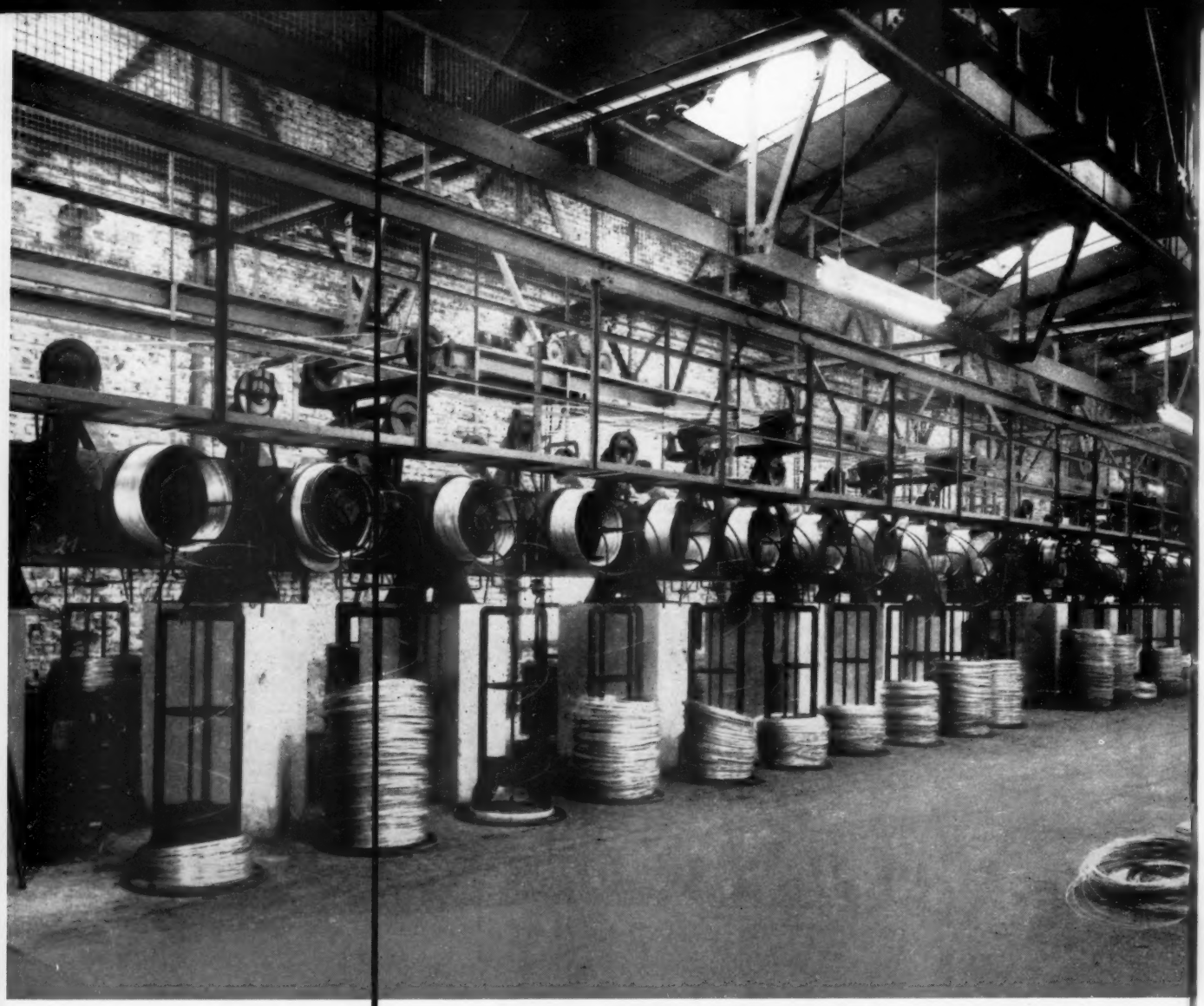

WIRE TAKEUP FRAME (40 stationary blocks), for galvanized wires, installed above floor level for processing of large coil weights. Capacity:—85 tons per 24 hrs., based on average wire diameter of .098"

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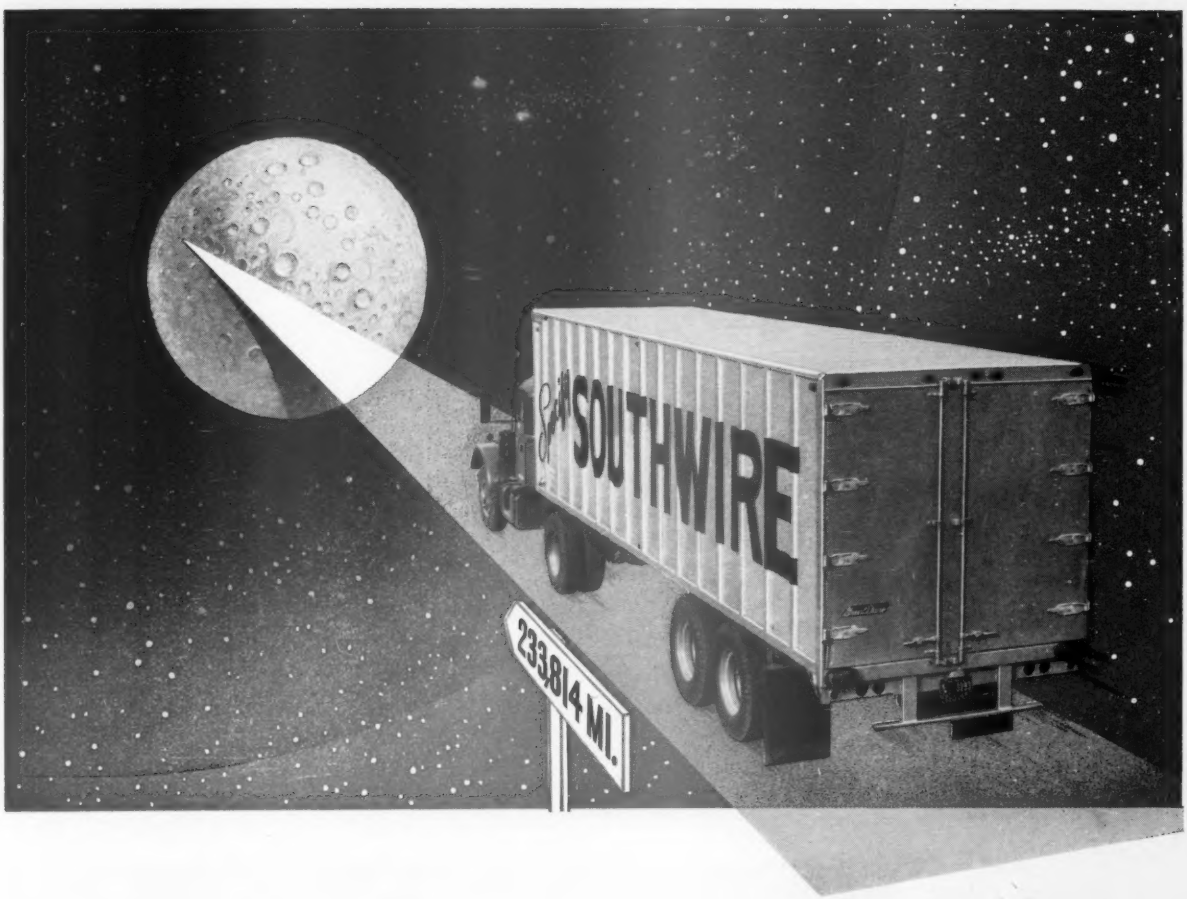


We shoot for the moon every month!

The mean distance from the surface of the earth to the surface of the moon is 233,814 miles. Every month Southwire trucks come close to registering that many miles right here on good old terra firma. Our record so far was set at 229,893 miles in December 1959.

Like some others who are shooting for the moon, we haven't made it yet, but that doesn't keep us from trying. Someday soon we'll do it, and then we'll try for the round trip—467,628 miles!

Far-fetched? We think not. It points up Southwire's unwavering aim to produce more and better wire, and better service.

How does anyone reach the moon unless he shoots for it?

Southwire® Company

SOUTHWIRE serves the world

Carrollton, Georgia — TErrace 2-6311

- Bare and Weatherproof Copper and Aluminum Line Wire
- Neoprene, Polyethylene, and VWP* (Vinyl) Weatherproof Copper, Aluminum and Triplex
- U.R.C. (DBWP, TBWP) Copper
- Copperweld® Conductors
- Copper and Aluminum Building Wire
- ACSR and All Aluminum Cable
- Galvanized Steel Guy Strand and Static Wire
- Aluminized Steel Guy Strand and Static Wire
- Aluminum Alloy Wire
- Cable Accessories
- NM Sheathed Cable
- ALSO FABRICATORS OF COPPER AND ALUMINUM FOR WIRE AND CABLE MANUFACTURERS

THINKING ABOUT WIRE WEAVING LOOMS?

WAFIOS

ROUND MESH and DIAMOND MESH LOOMS
for
FIRE SCREENS, CONVEYOR BELTS, FISH NETS, etc.

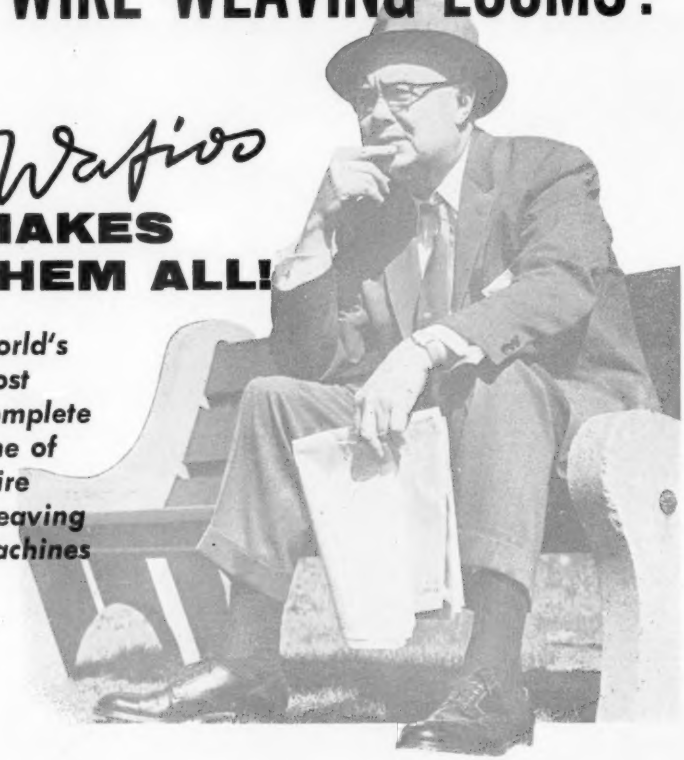
CHAIN LINK FENCE LOOMS

HEXAGON MESH LOOMS
for
POULTRY and STUCCO NETTING

CRIMPED MESH LOOMS

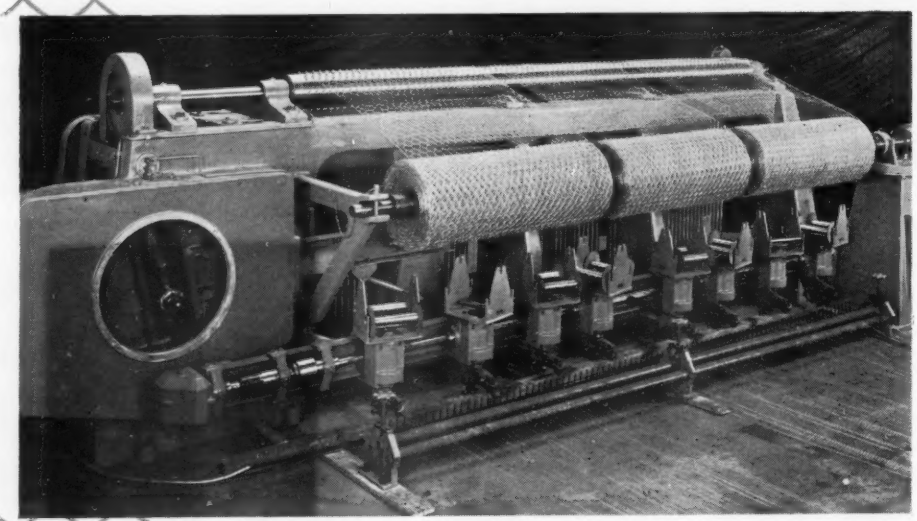
Wafios
MAKES THEM ALL!

World's Most Complete Line of Wire Weaving Machines



MODEL HDS
22 & 33

The fully automatic **HEXAGON MESH WEAVING LOOM HDS** is designed for poultry and stucco netting with 100% reverse twist in mesh sizes from ¾" to 4" and widths up to 11 feet.



Attachments can be supplied for selvage wires or reinforcing wires every 6" over the width of the mesh. We can also supply an attachment to double the mesh width.
These looms will produce mesh at extremely low cost per foot and with small capital outlay. Output is unusually large.

WAFIOS
MACHINERY CORP.
61 HUDSON STREET
HACKENSACK, NEW JERSEY

WAFIOS-MASCHINENFABRIK,
Wagner, Ficker & Schmid,
REUTLINGEN/GERMANY

WRITE FOR CATALOG AND COMPLETE INFORMATION

ROYLE

VECTOR CV

by ROYLE

Offers cost advantages to producers of High Voltage Power Cable

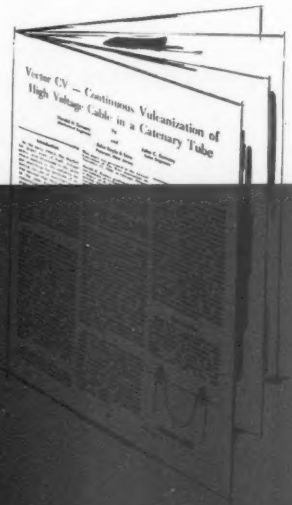
Vector CV incorporates the good features of both horizontal and vertical CV systems without the limitations of either . . . limitations of cable size or height of building.

Since Vector CV utilizes the catenary curve — the only curve a cable can assume when freely supported at two points not in the same vertical plane — deformation and scuffing of the cable's outer jacket is eliminated, which tension alone cannot do.

Also a catenary curve can be adapted to any building and any size wire can be run in that curve. There is no need to build 7 or 8 story buildings in order to vulcanize large diameter cables.

Because Vector CVs are ordinarily planned with 200 feet of steam tube, the average rate of productivity is 300% higher than a vertical CV installation with a vulcanizing tube 65-70 feet high.

In short — in initial installation costs, in speed of productivity and in versatility of cable size capacities, Vector CV by Royle offers cost advantages which should be carefully investigated by every producer of High Voltage Power Cable.



JOHN ROYLE & SONS

Pioneered the Continuous Extrusion Process in 1880

Home Office, V. M. Hovey, J. W. VanRiper, SHerwood 2-8262. **Akron, Ohio,** J. C. Clinefelter Co., BLackstone 3-9222. **Downey, Cal.,** H. M. Royal, Inc., TOpaz 1-0371. **London, England,** James Day (Machinery) Ltd., Hyde Park 2430-0456. **Tokyo, Japan,** Okura Trading Company, Ltd., (56) 2130-2149.

JOHN ROYLE & SONS, 10 Essex Street, Paterson 3, New Jersey

Please send me, without obligation, a copy of the Vector CV reprint.

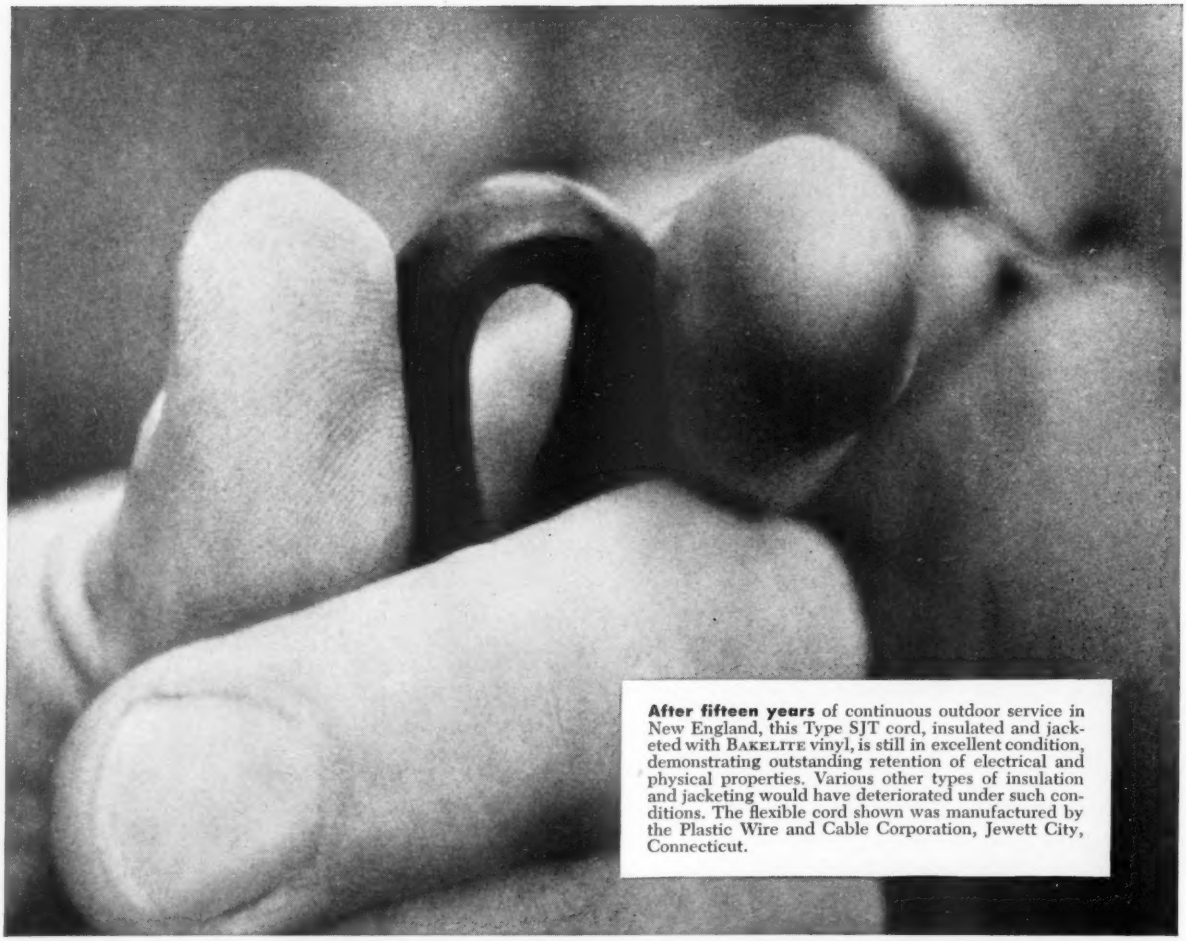
NAME _____ TITLE _____

COMPANY _____

STREET _____

CITY _____ ZONE _____ STATE _____

Use this coupon for your free copy of "Vector CV Continuous Vulcanization of High Voltage Cable in a Catenary Tube" reprinted from Wire and



After fifteen years of continuous outdoor service in New England, this Type SJT cord, insulated and jacketed with BAKELITE vinyl, is still in excellent condition, demonstrating outstanding retention of electrical and physical properties. Various other types of insulation and jacketing would have deteriorated under such conditions. The flexible cord shown was manufactured by the Plastic Wire and Cable Corporation, Jewett City, Connecticut.

With BAKELITE® Vinyl Insulation and Jacketing... you get this kind of reliability even after 15 years

This simple bend test can be an unusually severe one . . . especially for covered wire that has been exposed to the weather for 15 years. Despite such exposure, the electrical cord easily passed this and other tests, illustrating the high degree of reliability and safety provided by insulation and jacketing of BAKELITE vinyl. The outstanding long-term performance of these materials is further verified by the comparison shown in the table.

That's why an increasing number of wire and cable manufacturers are using BAKELITE vinyl as insulation and jacketing for their products. Through experience, they have learned that for utmost serviceability, quality BAKELITE vinyl offers an impressive list of advantages including . . . outstanding resistance to aging, exceptional toughness, resistance to deformation, moisture and chemicals, flame resistance, and good electrical properties.

Demand the reliable performance that BAKELITE vinyl and polyethylene can provide your wire and cable products. For more information about BAKELITE Brand plastics, write Dept. IR-160D, Union Carbide Plastics Company, Division of Union Carbide Corporation, 270 Park Avenue, New York 17, N. Y. *In Canada:* Union Carbide Canada Limited, Toronto 12.

PHYSICAL PROPERTIES OF SJT CORD

Test Data shows excellent retention of properties even after 15 years operation.

	Underwriters' Laboratories Minimum Requirements For Class II	Original	After 15 Years Service
Jacket			
Tensile Strength, psi	1600	1700	1510
Elongation, %	200	300	300
Primary Insulation			
Tensile Strength, psi	1600	3000	3500
Elongation, %	200	275	260

Electrical Safety Factor (after 15 years)—No breakdown with 50,000 volts applied between conductors. (This Type SJT cord is rated for only 300 volts.)

UNION CARBIDE

BAKELITE and UNION CARBIDE are registered trade marks of Union Carbide Corporation.

HOW KEYSTONE WIRE *adds Sales Appeal* to bobby pins...

To manufacture millions of identical bobby pins, Sta-Rite Ginnie Lou, Inc., Shelbyville, Illinois, needed a high quality spring wire that would perform consistently with long runs in their high-speed automatic wire forming machines.

For extra "sales appeal", Sta-Rite Ginnie Lou specified a wire with superior surface that would take an attractive finish to please discriminating women. It had to have high test flex and maximum spring back qualities. This called for uniform temper and close diameter tolerance throughout the coil.

Keystone Metallurgists, in close cooperation with Sta-Rite Ginnie Lou, developed a white liquor finish, high carbon *completely clean* spring wire with all these qualities. The large coils are specially packed with rust preventive in payoff packs for long trouble-free runs.

Says Vaughn C. Wallace, Vice President in charge of manufacturing, "Keystone Wire, with its superior finish, produces a bobby pin which meets our high standards of quality and ready acceptance in thousands of outlets across the nation." Keystone's excellent wire forming features are the result of accurately controlled thermal treatment and correct chemical analysis to provide the right structure for this difficult cold rolling and forming operation.

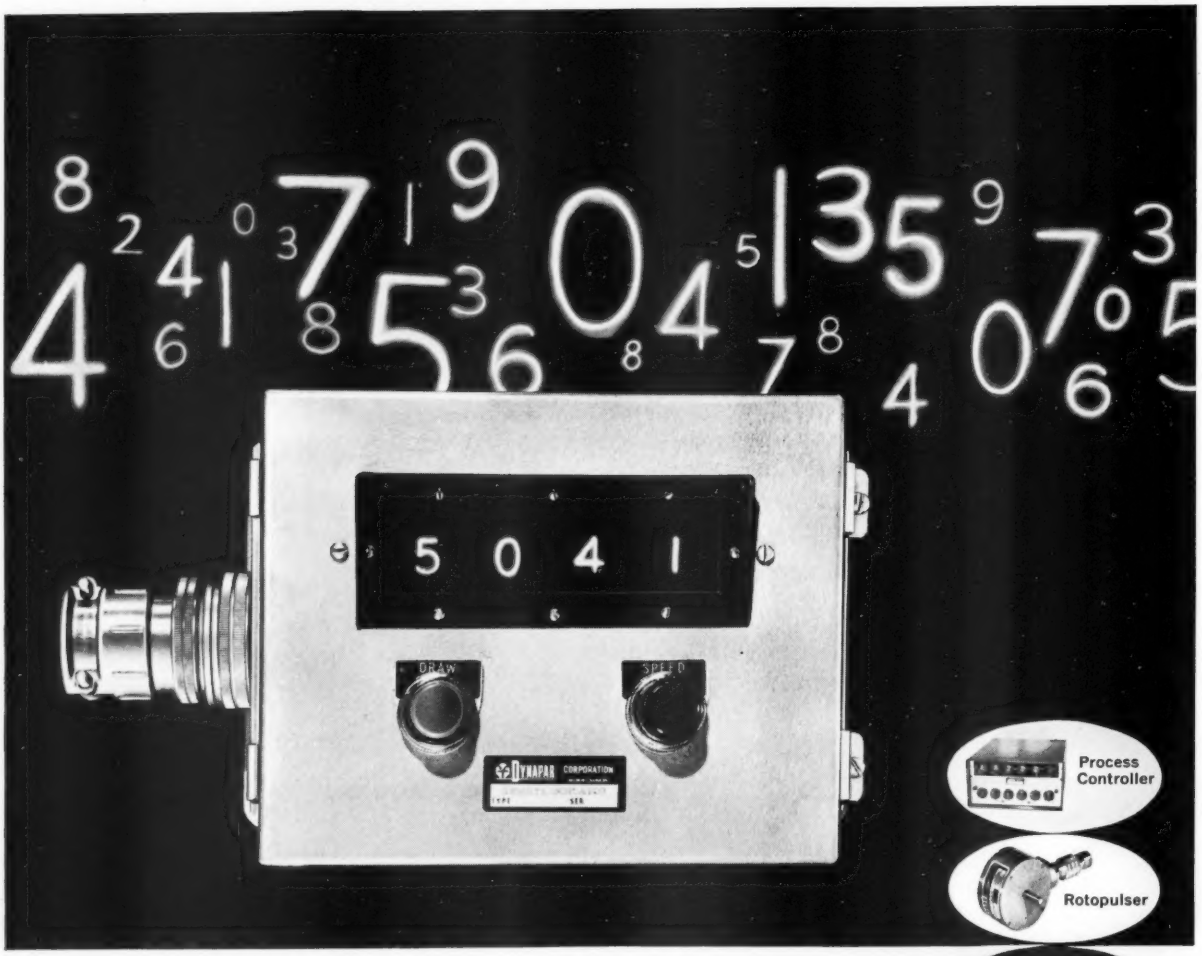
Keystone Wire Specialists can produce a wire for your most exacting specifications. Contact your nearest Keystone Wire Representative soon. Or write us concerning your wire problems.

Keystone Steel & Wire Company, Peoria, Illinois

KEYSTONE

WIRE FOR INDUSTRY

MANUFACTURED AT PEORIA, ILLINOIS, U. S. A.



NOW...Louis Allis offers DYNAPAR* Digital Control Systems!

Louis Allis can supply accurate digital controls designed to industrial standards for a wide variety of continuous process lines

For any production process, Louis Allis can furnish not only motors, drives, and controls, but also digital monitoring equipment to provide visual readout and process control signals.

The answer is DYNAPAR Digital Control — a highly accurate digital logic system that can count, measure, totalize, indicate, time, or control depending on the requirements of the application. Digital systems are ideally suited for high speed counting — accurate measurement of speed and draw — automatic cutting-to-length — automatic positioning — and many other applications.

Dynapar's digital devices utilize precise pulses, and eliminate the drift inaccuracy inherent in magnitude-measuring analog systems. There's no need for constant calibration or adjustment. Pulses are reliably provided by rugged ROTOPULSERS, highly stable sensing and pulse generating devices—visual indication is obtained by easily-read luminous direct numerical readouts. Control functions are accomplished by a variety of special devices tailored to specific operations. All DYNAPAR equipment features the most modern solid-state transistorized circuitry to provide long-life operation without maintenance.

Investigate to see how Louis Allis-Dynapar equipment can increase production and cut waste by automating *your* process. Call your local Louis Allis District Office, or write to The Louis Allis Co., 451 E. Stewart Street, Milwaukee 1, Wisconsin.

*Dynapar Corporation is the electronic subsidiary of The Louis Allis Co.

LOUIS ALLIS

MANUFACTURER OF ELECTRIC MOTORS AND ADJUSTABLE SPEED DRIVES

D-226

Improved Copper Coating for Wire Increases Coating Adherence, Color Uniformity

AMCHEM CUPRODINE* NO. 5 CHEMICAL PROVIDES LOW COST, NON-ELECTROLYTIC COATING FOR LUBRICATION OF CARBON AND STAINLESS STEEL WIRE, TIRE BEAD WIRE, COLOR CODING AND DECORATING PARTS

The latest Cuprodine from Amchem provides carbon and stainless steel wire and stampings with a particularly effective and adherent copper coating which appreciably reduces scratching of the wire and pickup and wear on dies during forming.

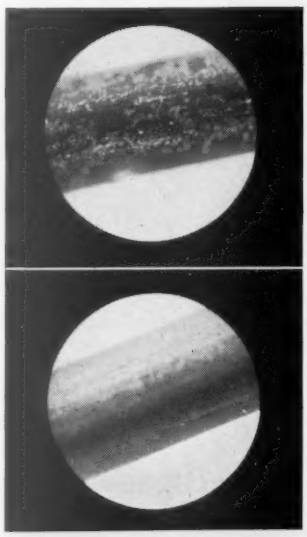
In treating tire bead wire, the uniformity of Cuprodine No. 5 coatings retained during drawing provide an excellent bonding surface for the rubber. Industry has found wide usage for Cuprodines in color coding parts while the durable and attractive copper coating provides an excellent decorative and protective finish on end products.

Investigate Cuprodine No. 5 for your own particular requirement—it's fast, economical, efficient—requires only simple immersion compared to costly racking and auxiliary equipment needed in electroplating processes.

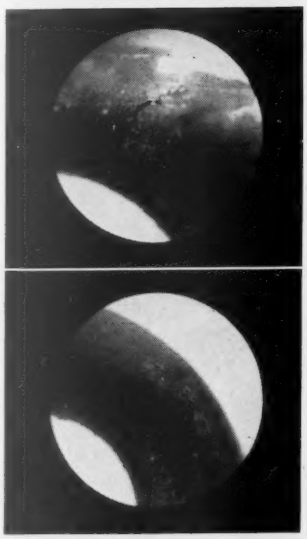
Another development from Amchem's Metal Protection Laboratories, the pioneer in specialized coatings for 46 years—from the first copper coating without the use of electroplating current, to today's standard in copper coating processes—Cuprodine No. 5.

AMCHEM **CUPRODINE**

Amchem is a registered trademark of **AMCHEM PRODUCTS, INC.** (Formerly American Chemical Paint Co.), **AMBLER, PA.** • Detroit, Mich. St. Joseph, Mo. • Niles, Calif. • Windsor, Ont.



At top, photomicrograph (50x mag.) of copper sulfated wire after removal of the coating in ammonium persulfate solution. Note heavy corrosive attack and pitting on copper sulfate-treated wire. At bottom, Cuprodine-treated wire subjected to same test.

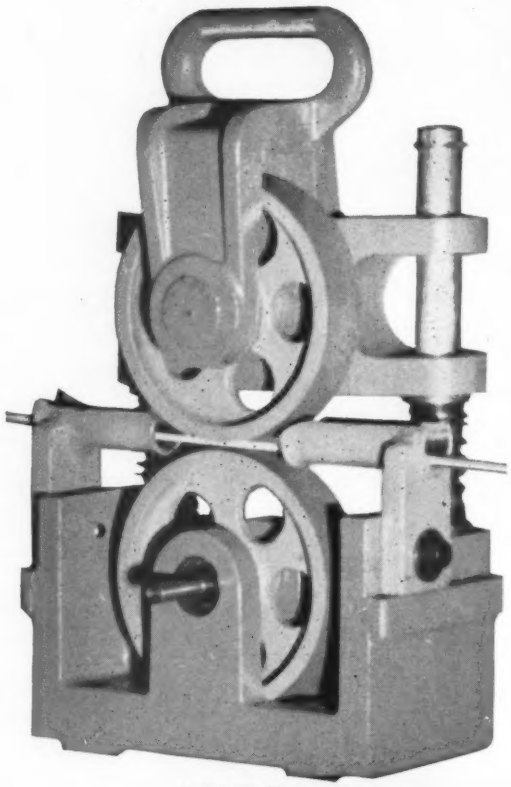


At top, photomicrograph (50x mag.) shows copper sulfated wire after simple manual bend test. At bottom, photomicrograph shows bend tested Cuprodine-treated wire exhibiting only a slight attack to coating while copper sulfate-treated wire shows heavy flaking of coating.

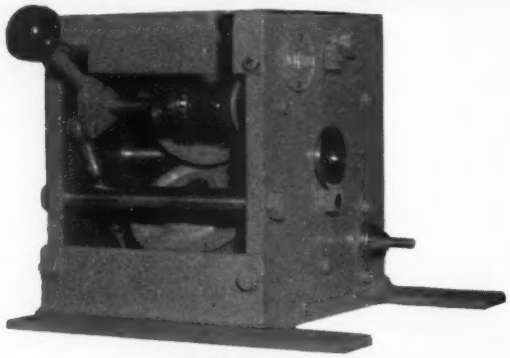
*Amchem's registered trademark for its copper coating chemical.

FEDERAL MEASURING MACHINES 2 or 3 WHEEL

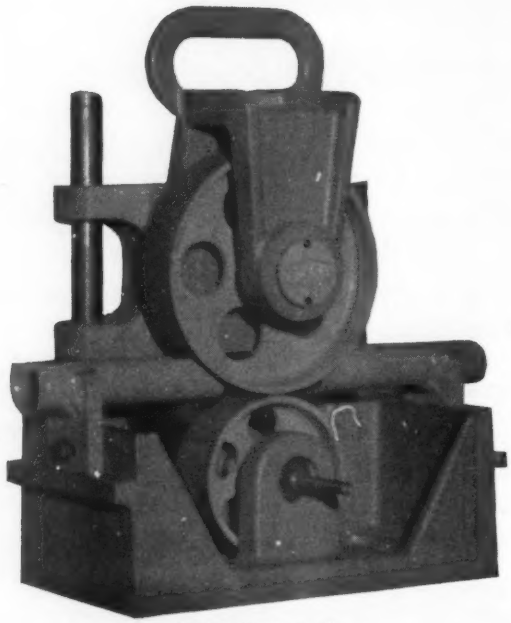
FROM 1/8 to 4" WIRE DIAMETER



Model 100 ⅛ to ½"



Model H1 ⅛ to 1"



Model 200 ½" to 1"

OTHER FEDERAL PRODUCTS

PAYOFFS • TAKEUPS • CAPSTANS
RE-SPOOLERS • MEASURING MACHINES
PAYOFF PAKS • COLLAPSIBLE COILING REELS • COILING MACHINES • PLANETARY CABLERS • PREHEATERS

TEST EQUIPMENT

SPARK TESTERS • HI-POTENTIAL TESTERS
A.C. - D.C. - ELECTRONIC

THE FEDERAL MANUFACTURING CO. WALLINGFORD, CONN.

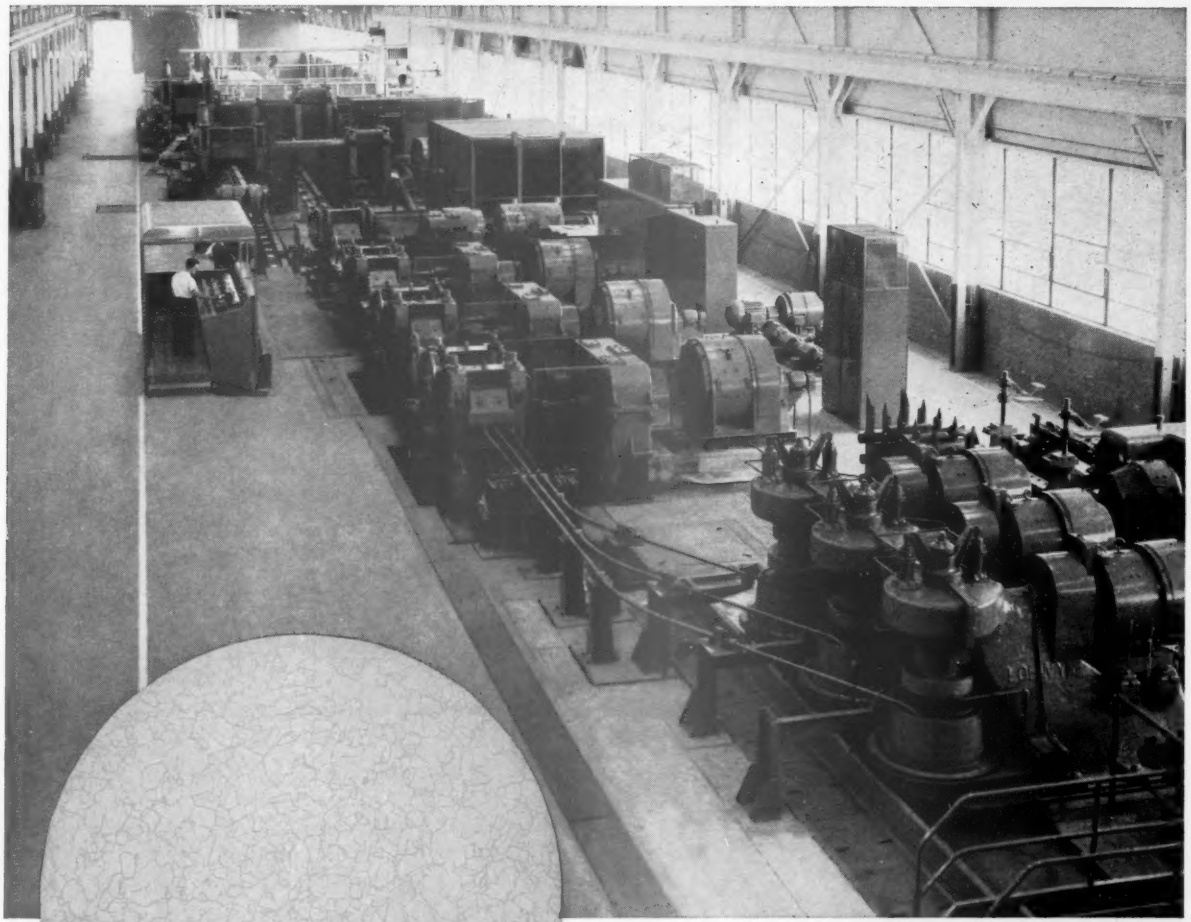
WIRE MACHINERY • TESTING EQUIPMENT

SALES REPRESENTATIVES

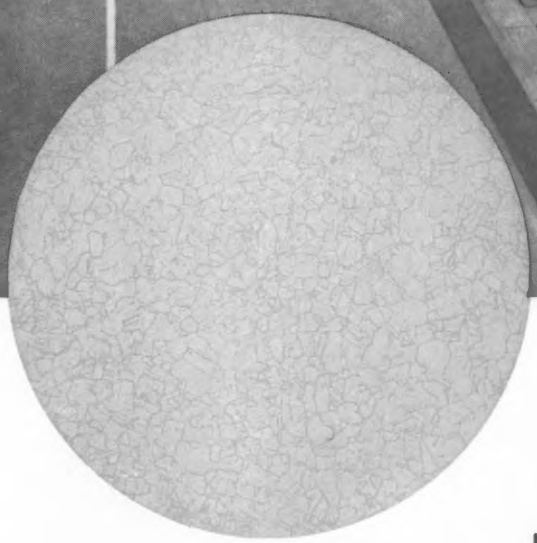
West Coast
THOMPSON ASSOCIATES
Palos Verdes Estates, Calif.

Mid-west
PLASTIC & EQUIPMENT SALES
8232 Major Avenue, Morton Grove, Ill.

Canada
E. V. LARSON, LTD.
Toronto, Canada



B-L-H Loewy continuous copper wire rod mill installation



Photomicrograph of copper rod 200X blow-up

FROM B-L-H LOEWY MILLS . . .
MAGNET WIRE OF HIGHEST UNIFORMITY

The drawing of magnet wire offers the sternest challenge to the product of a wire rod mill. B-L-H Loewy mills provide refined grain and homogeneous rod to fully meet this challenge. High speed rolling provides exceptional uniformity throughout length of rod.

In addition to product excellence, B-L-H Loewy mills provide almost completely automated operation, compact layout, detail refinements and economy. Also noteworthy is the fact that smaller quantities of rod can be produced on B-L-H Loewy mills on a competitive basis.

Consult us, without obligation, on a mill which will answer your individual—and most exacting—requirements for wire rod. Write Dept. I-4.

BALDWIN · LIMA · HAMILTON

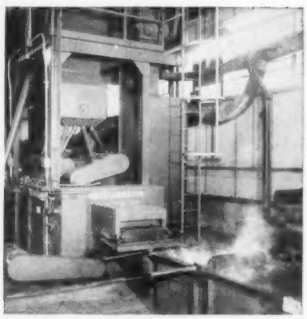
Industrial Equipment Division · Philadelphia 42, Pa.

Non-stop blast cleaning straightens out wire rod descaling

A demonstration of WHEELABRATOR'S

VITAL VALUES

Multiple strands of hot-rolled rod proceed through blast cleaning, patenting, and coating in one continuous straight line operation at Leschen Wire Rope Division of H. K. Porter Co., Inc. Wheelabrator mechanical blast descaling is the essential step that makes this automated processing possible. Floor space is reduced, pickling is eliminated, various surface finishes are possible and cleaning time is reduced, all of which add up to impressive cost savings. Wheelabrator's unequaled experience in blast descaling of wire is at your service. It is another of Wheelabrator's Vital Values that mean bigger savings for you.



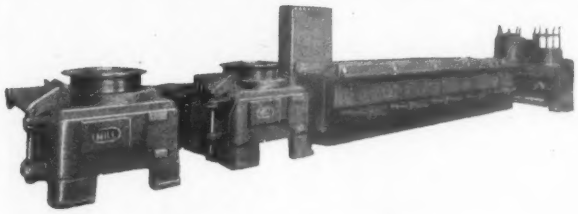
Wire rod can be straightened, blast cleaned, coated, drawn and cold headed in one continuous, straight-line operation. For full details, ask for Bulletin 148-D.

VITAL VALUES FOR INDUSTRY

WHEELABRATOR WIRE ROD DESCALING

WHEELABRATOR CORPORATION, 389 S. Byrkit St., Mishawaka, Indiana, In Canada, WHEELABRATOR CORPORATION OF CANADA, LTD. 1901 Birchmount Rd. P.O. Box 490, Scarborough, Ontario

A subsidiary of Bell Intercontinental Corp.

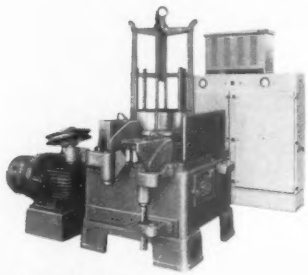


MULTIPLE STRAIGHT-LINE WIRE DRAWING MACHINE, Type MV 25, max. inlet dia. 8 mm. (hard steel), 12 mm. (mild steel), 14 mm. (copper wire).

MILL

MILL

MILL

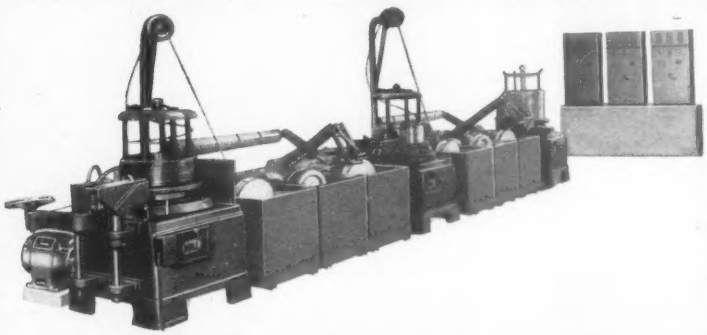


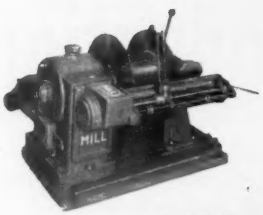
WIRE DRAWING BLOCK, Type TV 25/2, max. inlet dia. 6.5 mm. (hard steel), 8 mm. (mild steel), 12.7 mm. (copper wire).

NOVELTY

MILL

CONTINUOUS WIRE DRAWING AND COPPER COATING EQUIPMENT, suitable for drawing and copper coating hard and mild steel wires for bright copper coated wire.





SPOOLER, Type RM 15/1

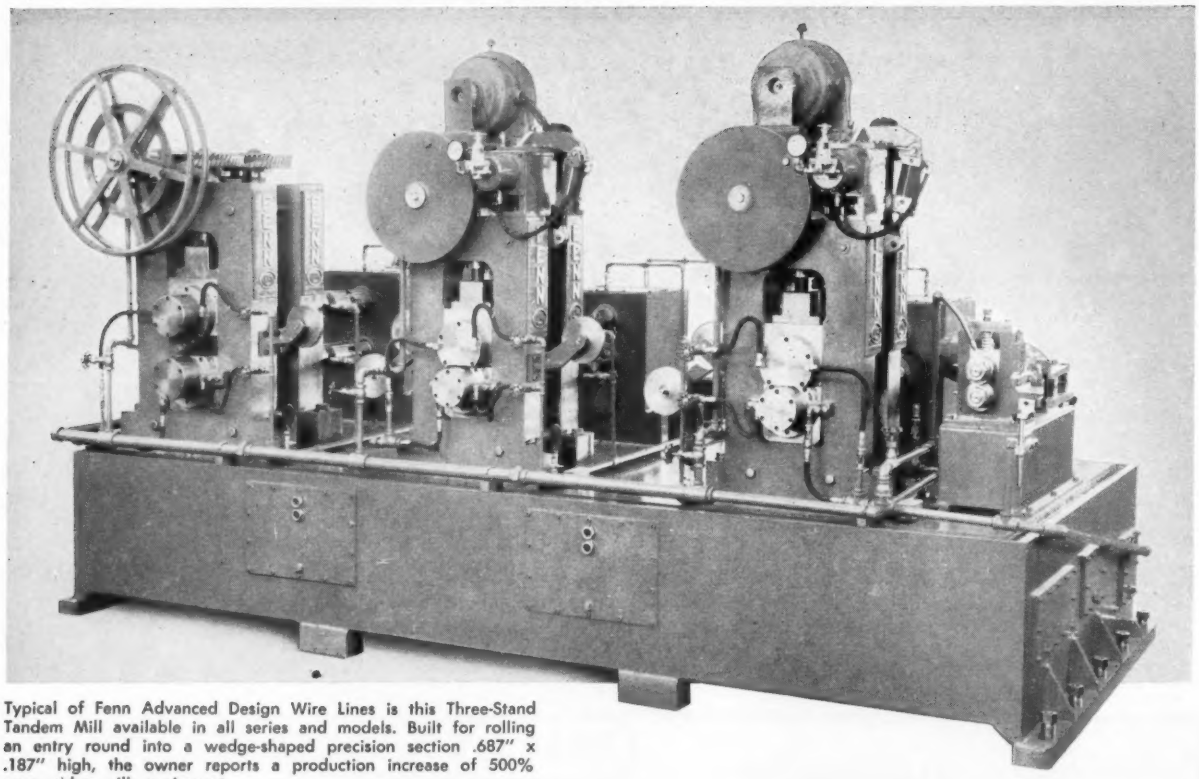
The Societa Generale delle Macchine "Mill" announces the availability of the following equipment:

Single or double deck Bull Blocks • Multiple Pass Straight Line Wire Drawing Machines • Submerged System Wire Drawing Machines • Continuous Wire Drawing and Copper Coating Plant • Dual Reel Take-ups • Rotating Die Holders • Constant Tension Spoolers • Single Coilers • Multiple Coilers • Mechanical Descaler • Roller Pointing Machines • Rod Flippers • Electrical Winch • Rotating Flippers • Pull-in Dogs • Deburring Pliers.

GENERAL CATALOGUE ON APPLICATION.

SOCIETA GENERALE DELLE MACCHINE "MILL"

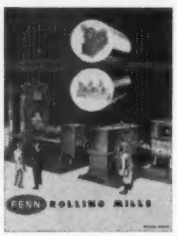
Sede Soc.: via V.Monti, 9, Milano.
Uffici: via Priv.Asti, 15, Milano.
ITALIA



Typical of Fenn Advanced Design Wire Lines is this Three-Stand Tandem Mill available in all series and models. Built for rolling an entry round into a wedge-shaped precision section .687" x .187" high, the owner reports a production increase of 500% over older mill equipment.

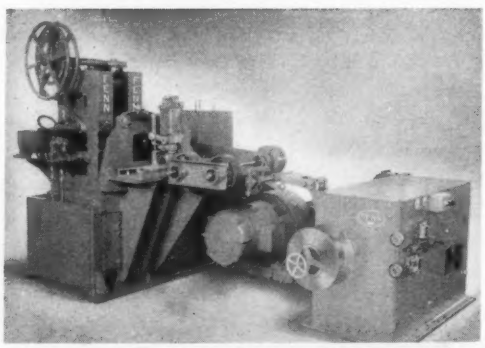
Production proven

When you specify a Fenn Wire Flattening Mill . . . you can do so with confidence. Regardless of its size, number of stands and accessories, its advanced design, precision engineering and construction are all **production proven** in many installations for flattening both ferrous and nonferrous wire to exacting tolerances. Fenn can supply standard mills or lines engineered for your specific or unusual requirements. Important also to the user is Fenn's **follow-through** in your plant during and after installation. Fenn's central engineering department and a nationwide staff of factory-trained field engineers are always at your service. Write for Catalog FRM-58. The Fenn Manufacturing Company, Newington, Connecticut.

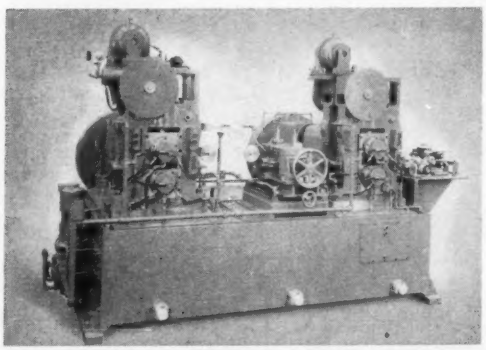


FENN

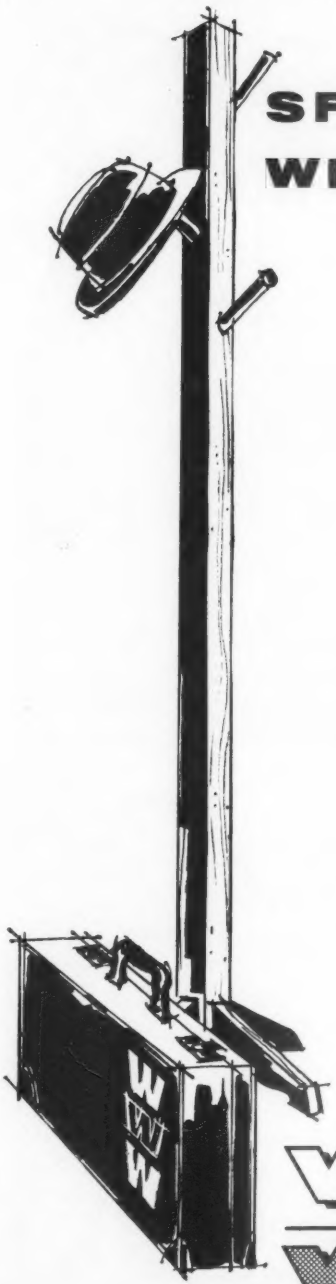
WIRE FLATTENING MILLS



The popular Fenn 5 in 1 Wire Line is **production proven** for versatility and precision. This compact mill draws, flattens, sizes and edges, sizes and shapes, gages, and bundles, yet occupies as little as 72 square feet of floor space. Costs as low as $35,000 complete. "A best buy" wherever applicable.



Fenn Two-Stand Tandem Wire Mill with 8" rolls. Equipped, as illustrated, with electric screwdowns, edger and magnetic continuous width and thickness gages. Rolling speeds up to 1200 fpm.



SPECIALIST AT WIRE SPECIALTIES:

WISCONSIN offers valuable technical assistance...backed by production facilities geared to your specific needs!

When custom-drawn wire specifications are the toughest, application problems the knottiest, production schedules the tightest . . . that's when *WISCONSIN* gets its chance to shine.

WISCONSIN WIRE WORKS draws specialty wire to consistently fine tolerances. Equally important, this leading producer of precision-drawn alloy wire has the know-how and the facilities to assure you exactly the characteristics best suited to your wire requirements.

Precision-drawn specialty wire from *WISCONSIN* costs no more than most commercial grades.

So, contact *WISCONSIN WIRE WORKS* to discuss high-quality wire for your product. Return the attached coupon . . . fastened to your letterhead. In the Mid-West contact Charles G. Stevens Company, 29 South Jefferson St., Chicago 6, Illinois.

WISCONSIN WIRE WORKS

Appleton, Wisconsin

Gentlemen:

☐ Please send *WISCONSIN* brochure and price list.

☐ We want to speak with a *WISCONSIN* representative regarding possible future applications.

WISCONSIN WIRE WORKS
Box 767, Dept. W-41
Appleton, Wisconsin

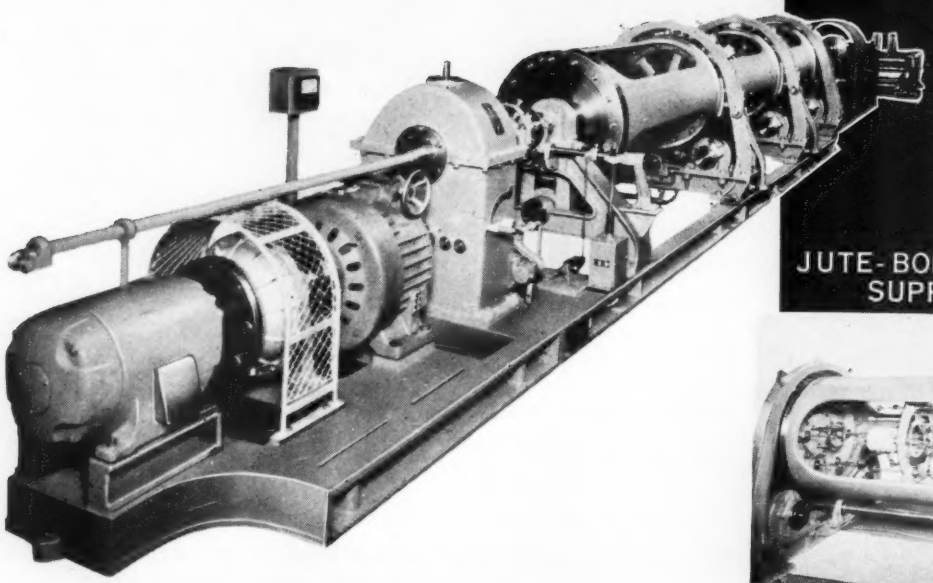
NAME .....

TITLE .....

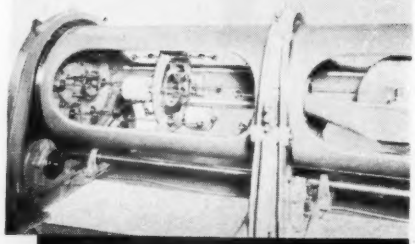
(Company name and address on letterhead)

MIYAZAKI'S TUBULAR TYPE CABLE ASSEMBLING MACHINE

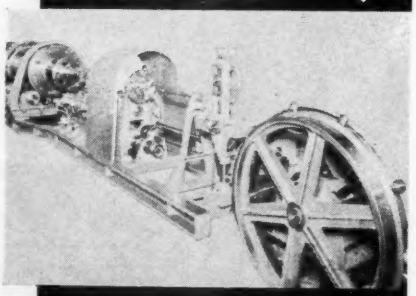
18"×2 BOBBINS COMPLETE WITH 24 JUTE-BOBBINS AND 1 SET OF TAPING HEAD



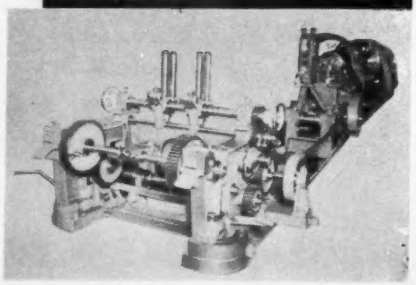
JUTE-BOBBIN SUPPORTERS



TAPING HEAD



TAKE-UP



SPECIFICATION

Cable dia. to be assembled	3.6~5.6 mm
Number of bobbins	2+1 (Supply stand)
Bobbin size	18"φ (In flange dia.)
Revolution	100~400 rpm (Steplessly)
HP required	15 HP
Pitch length	60, 80, 100, 150, 200, 250, 300, 350mm
Number of jute bobbins	24
Jute bobbin size	180mmφ (In flange dia. ~1.5kg)
Taping head	Center type, 1 head
Brake	Air brake

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Kaizuka, Osaka, Japan.

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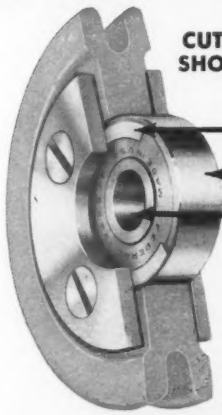
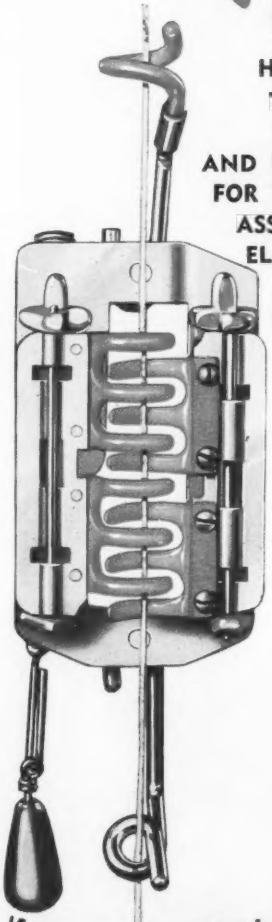


Diameter of Pulley 2"

Heanium® Pulleys outwear their bearings, but the bearings are easily replaced.



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If guide wear is a problem in your mill . .

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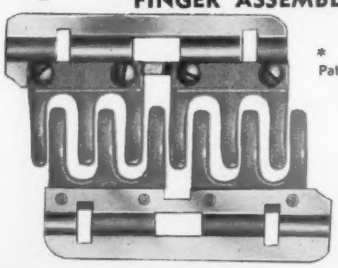

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Whenever you are confronted with a guide problem our Engineering Department will be glad to work with you in arriving at the best solution. Whether your problem calls for an entirely new design or the re-designing of an existing guide, feel free to call on us for help. Custom made samples can be furnished to your specifications.

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MODEL FAB-33 STANDARD SPECIFICATIONS: Type of Fabric. The standard fabric welder is completely equipped electrically and mechanically to produce mesh in the following sizes and spacings.

WIRE GAUGE	LINE SPACING	STAY SPACING
11½ ga. thru 12½ ga. galv.	1", 2", 4", 6" & 8"	1", 2", 4", 6" & 8"
13 " " 14½ " "	1", 2", 4", 4" & 8"	1", 2", 4", 6" & 8"
15 " " 16 " "	½", 1", 2" & 4"	½", 1", 2" & 4"

Standard machine produces 78" wide fabric or multiples thereof.
Other gauge spacings and widths available upon request.

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- HIGH SPEED OPERATION
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- FULL ELECTRONIC CONTROL — NO RELAY
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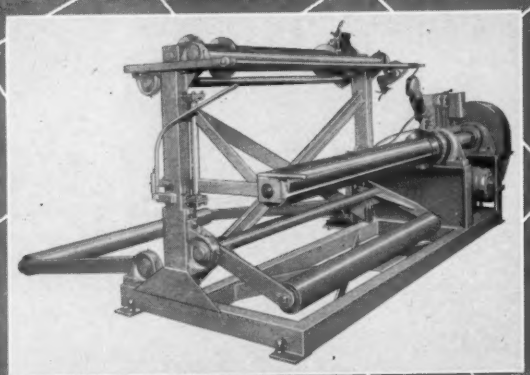

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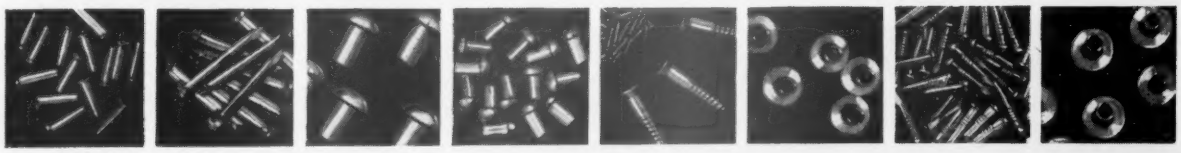
will do any forming job better



This wire is the best for formability. It is brass wire. It is ductile, strong, uniform, sound.

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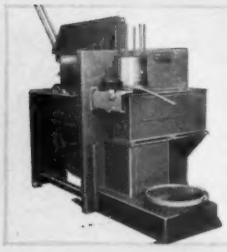

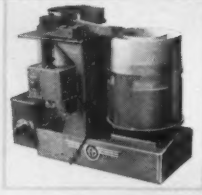

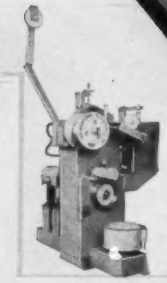

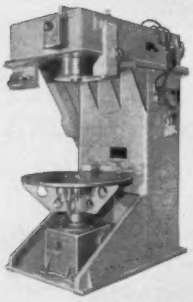

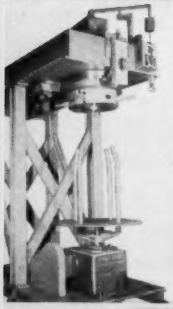

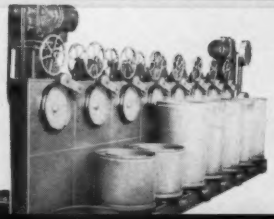

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A line of versatile wire take-up and packaging machines with coil ranges from 16" to 36", "non-stop" changing, capacity to 3/8" diameter high carbon steel. Available in multiple units, dovetailed to your production line.

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The Wire Outlook

Unemployment appears to be the Number 1 problem facing the Administration. It stands now at 6.6 percent of the nation's employables. While not expected to go below this, and indeed in the Spring a rise is looked for, it is a serious situation. Probably more than any one other factor, it accounts for the recent lessened buying by the consuming public, even though such buying remains at fairly high levels. Consumers, however, have been buying cautiously and conservatively.

The gross national product for 1960 was at a rate of over $503 billion, up 4.4 percent over 1959. It is predicted that the last quarter of this year will show a GNP rise to a rate of around $520 billion. Currently the GNP is off about 8 percent from the final quarter of 1960. Personal spending was over $400 billion last year—a husky figure.

Automobile sales are picking up, construction awards are better than last year, the home building outlook has improved, steel is showing signs of life, and inventories are running down to a point where buying must begin. All of these factors are behind a growing feeling that the worst is behind us. Yet, while all do not agree, the recession is considered to have been a mild one. Taking the plus and minus signs as a whole, the plusses are in the majority.

Construction contracts in January were 13 percent over 1960. Residential building awards were 5 percent up. Heavy engineering contracts were 50 percent higher. Increases are also reported for public buildings, schools and hospitals. Business plans for new plant and modernization are higher now than last year. Consumer spending is increasing in many sectors of the country, and the stock markets appear to be betting on a business upturn, albeit some of the recent security price rises have been an anticipation of further inflation.

There is no question but that the Administration's projects will bring about deficit spending, always a result of Democratic policies, but on the plus side of the Administration's thinking are two points that are helpful under present circumstances. The first is that if business activity does not rise of its own accord, federal spending must be employed to give it a shot in the arm; the second is that our new president believes that business should be nurtured and encouraged, rather than persecuted. He has stated that business creates prosperity and jobs and appears to be for private enterprise, feeling that business interests are not something apart from those of workers, of government or of the general welfare, so that a good climate for business must be cultivated for the benefit of all.

Two kinds of federal spending are envisioned. One is to step up government business to help business and the other is to spend on projects that in the opinion of the new Administration are good in themselves. Whether these policies are wise is a matter of the personal judgment of individual citizens. In any event, the Congress has to approve the outlays and constituents having opinions should voice them to their representatives.

Orders for wire are slightly improved, both for manufacturers' wire and merchant products. Automotive wire orders have been slow, but the Spring should show an upturn here.

An interesting effort to recapture baling wire business from the importers is going on in the western states, in which a large producer's field men are talking to farm groups in an effort to sell the idea that American wire is better, better for the farmers, and better for the economy.

Any pickup in business will be gradual. The economy will move ahead and the strongest basis for improvement lies in an expectation of better times to come.

Edmund D. Sickels

EDITOR

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- **Specially formulated fatty compounds assure high-performance result**
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WIRE
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DRAWING — ROLLING — EXTRUDING — FORMING — FABRICATING

Vol. 36 APRIL, 1961 No. 4

The Effect of Technical and Educational Development on the Labour Structure of the Wire Industry

by H. Coates, Esq.
Assistant Personnel Manager
Rylands Brothers Limited
Warrington, England

This paper was presented at a recent meeting of the Staff School of Frederick Smith & Co. Wire Manufacturers Ltd. in Halifax, England. The paper is copyrighted by the Smith firm, with whose permission and through whose courtesy it is published.

The author holds a degree of B.Sc. (Econ.) from London University.

In considering the consequences of changes in the techniques of production and in methods of education as they affect individuals at work in the particular context of the Wire Industry, we must not lose sight of one most important factor — namely that the Wire Industry is part of all industry; it does not exist in isolation. It is in competition with all other commercial and industrial activity for the use of the factors of production — the work of men and the use of land and of capital goods.

* * *

To some extent the factors of production may be substituted one for another. A farmer can improve the production from his farm by increasing his labour force and yet maintaining the same acreage, or he could increase his acreage but keep the number of men employed as it was or he could increase the amount of capital he applies to his undertaking by buying machinery or fertilizers. Each factor could, if increased in relation to the others, lead to an increase in production. The farmer must rely on his own judgement to decide what proportions are the most productive consonant with the greatest economy in the use of the money expended on the factors employed. By the use of money he has, to some extent, a means of measuring the value of an additional unit of each factor which he can apply to his business but, as the units within each group of factors are seldom identical, judgement and experience largely govern the course that is to be taken.

* * *

The absence of complete uniformity is particularly marked in the sphere of labour. Physical differences of stature, weight, strength and agility are very obvious. Equally significant in the association of the individual with the other factors of production are differences in intellectual capacity and temperament. Physical and intellectual capacities are, with temperament, interdependent factors. Psychologists tell us that work fulfils an instinctive need of man, hence where work — physically, intellectually and temperamentally appropriate — is performed then a considerable contribution to personal happiness is made. It is in such circumstances that the most effective work can be performed.

* * *

Those charged with the management of any particular industry have then a dual responsibility: on the one hand they must ensure that the people who find employment in their industry are provided with factories, machines and equipment, and with working arrangements that impose neither undue restriction nor strain upon their capabilities physical, intellectual and temperamental; and on the other that the right type of persons are recruited to fit the peculiar limitations that the industry may have.

* * *

Although complete absence of variation is not to be found, there are nevertheless a number of broad

groups into which a large proportion of workers of different types may fall. There are those who naturally emerge as the leaders within the groups in which they happen to be, and there are the larger numbers who are more content to be led. There are those who are happier working with their hands and those to whom the brain work is a more acceptable activity. There are those who feel the confinement of four walls and gravitate to jobs in the open air or which are of a mobile nature such as lorry drivers or commercial travellers, and there are their opposites who like to feel the security afforded by the familiar working place which they use every day.

* * *

Any separate branch of industry will find within its scope opportunities in varying degree to suit individuals from several or most of these groups. As often the location of certain industries may be governed by factors of topography, climate or markets we would find that the individual who is a cotton weaver in Lancashire could quite well be happy as a woollen weaver across the Pennines in Yorkshire, a worker on a motor car assembly line in the Midlands or a wire-drawer, barb spinner or nail machine operative in any of the centres of the Wire Industry, had his place of residence been different. The environment of repetitive work tending machinery within four walls for eight or so hours a day is much the same whether the material passing through the machines is cotton, wool, plastics or steel. The same sort of picture could be drawn of other groups of workers.

* * *

The word "development" has a connotation of "growing" or "progressing" and it is then for the managements of an industry who seek growth and progress for their line of business to see that their industry is made relatively more attractive than rival branches as, without doubt, the business which is going to be the most productive is that wherein the most efficient persons are employed. When an industry becomes attractive there is a movement of persons toward it. This movement will be of two types of people. In the first place there will be individuals who actually move out of other employment to the more attractive one and secondly new entrants from schools and universities will tend to seek employment in that industry rather than another. In either case there is given the opportunity for the exercise of a greater degree of selection of suitable persons from candidates who would naturally be more numerous than for a less attractive industry.

* * *

There has then to be considered what are the factors which make an industry attractive. A good deal of attention has been devoted to matters such as high wages and good physical surroundings in the proper provision of adequate light, warmth and ventilation. Of equal importance are considerations of management structures, arrangements for management and worker co-operation techniques, joint consultation, profit sharing schemes and the like. This essay seeks to examine the position as it is affected by the changes that are brought about by technical improvements and by changes that are taking place in the country's educational system which has repercussions on the labour structure of industry in that the individual who has been educated in one way is a different worker from what he would have been had he been educated in another way.

* * *

These various considerations are inter-active. The more highly educated the individual is the more likely he is to desire to play a part in saying how an industrial concern should be run — the more likely he is to be aware of the beneficial effects of good lighting and ventilation — and the more likely he is, by virtue of his abilities, to command higher rates of pay.

* * *

The more highly developed are the faculties of the individual and the more it is advantageous to provide him with elaborate mechanical assistance for he is likely to use it with better effect than would a less able person. Such a worker too would feel less frustrated and hence be more effective than he would if the machinery with which he worked was inferior to the best available. There is, as has been said, a satisfaction to be gained from doing a good job well and unless there is a forward looking attitude in an industry's management revealing itself in the adoption of up-to-date machinery and techniques there will tend to be stagnation. The progressive individual will tend to exercise his talents elsewhere and a cumulative slowing down effect may well be the result if he and more of his like leave an industry.

* * *

This desire for work which enables the individual to make the most of his talents is reflected in the attitudes of school leavers. The educational system is being geared increasingly to the training of technologists and technicians. The demand for and provision of places in universities and technical colleges rises year by year. Workshop Practice figures in the curricula of many technical and modern schools and leavers are urged by their career advisers and by their parents to "get a trade". Increasingly there is dissatisfaction with routine and monotonous work and those industries which offer interest as well as good wages will find that they can attract the better type of entrant from the schools. Those who fail in this direction will find that their share of school leavers will be from the less able and from those disappointed in their search for more acceptable employment in other directions.

* * *

Present day educational practice is much more directed to the analysis of the aptitudes of the children and young persons within its care and, by giving the encouragement and training appropriate to them, to the fullest possible development of their personalities. Adoption of this system has certain effects. It involves selection which, taking place in the manner that it does—at secondary school and university entrance levels, means that many of the brighter individuals who in earlier days passed into industry with the main stream of young people are now given opportunities to develop

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—more pounds per unit—at greater speeds —with less grief and trouble.

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Packages 120 lbs. of wire to reduce your unit c Handles complete range of wires from #12 to #34 A ferrous and non ferrous. Designed with 10" top fl and 11" bottom flange for easy de-reeling over the l 12½" traverse, 6½" barrel and 1¼" or 1½" arbor Smooth lap-welded seam on barrel assures maxi strength and rigidity under pressure. Your packag wire can then be shipped individually in fiber pails bulk on pallets.

This long traverse reel is the answer to service prob that have plagued the wire industry for five years predict it will become the standard de-reeling proce the future. Smaller sizes available for fine wire.

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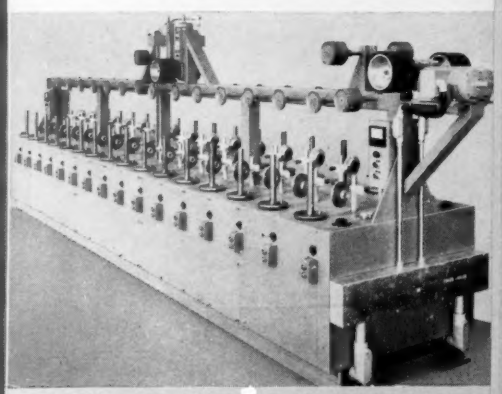
Growth . . . and the closeness with w dustry on special problems, has com in this field. Today, Acrometal mea *complete line* of equipment based on a faster, better and at lower cost. We int



EXAMPLE 2: VERTICAL SPINDLE SPOOL TAKE-UP

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their talents much more fully. The consequence of this is that less and less are the future members of the industrial hierarchy of management, from foremen upwards, going to be found amongst those who start work at fifteen. In the past a good many of those in all levels of management have worked their way up from the very bottom. Had those persons lived in the later age that we are now entering upon it is very probable that school and college would have claimed them for several years more and later released them to industry equipped with a much fuller training and a far wider knowledge.

* * *

The often lamentable performance of many young people when tested in such basic subjects as English or Arithmetic, for various industrial training schemes, suggests that the educational system still has much to do to put its house in order. Such performances should however be considered by those doing the testing, who find the results inferior to those they remember from their own youth, in the light that testing of this nature was formerly applied to very few young persons; persons entering clerical posts in industry — in the civil service — or in local government service were, by and large, the only ones so tested. Many of those who seem to fare so badly would, had they lived in earlier years, have been amongst the unfortunates who left school only to join the queues at the Employment Exchanges and would rarely have had occasion to write anything else but their names. It is to the credit of present day administrators that at least a modicum of understanding of the evils of unemployment that have for so long afflicted the people involved in the industrial structure of the country is being achieved, and acted upon.

* * *

The extraction, by selection procedures, of the more intellectually active children from that section of the people who usually man the shop floor jobs is likely to have an unlooked for effect on the trade unions for in this way one of the sources from which their more stable and articulate members are recruited is, to quite a large extent, being cut off. Organized labour, as well as the management side of industry, must appreciate that the forms of organization that have evolved are not necessarily hallowed by tradition and rendered immutable thereby, but that a flexibility of attitude to the scope and structure of the bodies, which have within their purview the maintenance of future industrial peace, is a necessity.

* * *

It has been suggested on a number of occasions that most industrialized countries are passing through a phase of development comparable in its importance to the decades at the end of the eighteenth and the beginning of the nineteenth centuries. Ours are the years of the Second Industrial Revolution. Automation and the new sources of power derived from nuclear fission or the chemical generation of electricity are likely to prove to be of as much significance as was the invention of James Watt's steam engine almost two hundred years ago. Developments of this type require a very much higher degree of training and education on the part of those whose job it is to operate the new techniques. We have seen that the educational system of our country is being modified to meet these new needs and if we refer to recent figures published in the Ministry of Labour Gazette we can see something of the effect to which the changes are giving rise. In the ten years from 1948 to 1958 the number of persons employed in manufacturing industries rose by 900,000. The significant point about this rise was that two thirds of it was in the number of those persons whose employment may be described as administrative, technical and clerical. The proportion of these latter rose from 16 per cent of all those employed in manufacturing industries to more than 21 per cent in the ten year interval. This reflects a similar change that has taken place in the United States of America about which Peter F. Drucker gave a wireless talk a year ago. In this talk attention was drawn to the fact that the group of people whose work was of a professional, technical and managerial type had grown to be the largest of the American occupational groups, out-numbering even those whose task it is to operate industrial machines. They were the most rapidly expanding group and if anything the rate of expansion was accelerating.

* * *

These observations show the trend of events and it is of interest to note from the Ministry of Labour figures how the various branches of industry relate to the whole pattern and, so far as the figures are available, how the Wire Industry in particular fares. Both in 1948 and 1958 the Chemical Industry was the one which is recorded as having the largest proportion of administrative and technical people in its make-up. They share too with the Engineering and Vehicular Industries in having a percentage increase in such persons greater than the average for all industries, an increase of six and a half per cent. In both years the Textile and Clothing Industries were the two with the lowest proportion of workers in the administrative and technical category; they were also amongst the industries which showed the smallest rate of increase. The Wire Industry figures in the Metal Goods group which was eighth out of fourteen in the 1948 table and ninth in the 1958 table. In both cases the proportion of administrative and technical workers was below the average for all industry and the rate of increase was some twenty per cent below the average increase and only two thirds of that accruing to the Chemical and Engineering Industries.

* * *

One of the means of assessing the vitality of an industry, we have suggested, is its ability to attract the best individuals newly entering from schools and colleges; an examination of the Ministry of Labour figures for school leavers up to the age of eighteen years underlines the impression given above, namely that the proportion of the more able entering the Wire Industry is tending to fall.

* * *

It would seem from the repeated requests made to Youth Employ-

ment Officers and prospective employers for entry to a "trade" that apprenticeships are amongst the most sought after openings for employment and therefore likely to go to the more able of the school leavers seeking employment and it can be accepted that those better equipped intellectually will take priority in engagements for professional or clerical work. The analysis of figures relating to school leavers in 1958 shows that of the total number 34 per cent took up apprenticeships, one per cent openings leading to professional qualifications, 9 per cent clerical vacancies leaving 56 per cent to other work. As might be expected, Engineering, Vehicle manufacture, and Building and Public Utilities took a proportionately very much higher number of apprentices. The Wire Industry however, numbered only 21 per cent of its newcomers as apprentices and for every 200 young men entering the Industry only one was hoping to achieve a professional qualification against one in every 100 of all entrants to industry generally. These figures relate to those young persons who start their working lives between 15 and 18 and accordingly take no account of university and technical college graduates, but experience would suggest that from this source also the Wire Industry recruits fewer than do many other industries.

* * *

A further point made by Peter Drucker was that the average age of industrial workers of what he terms the "blue collar" group, the machine operators, is higher than that of the professional, technical and managerial group. Experience again suggests that in this country too, those industries which have a lower proportion of administrative and technical workers amongst them have a higher average age than is prevalent in industry generally. Whilst a higher average age is not without its advantages in conferring experience and stability it cannot be denied that on the whole (here one speaks generally for there are many exceptions) it is the younger element who feel freer to experiment with new techniques and to whom we must look for future progress.

Points such as those mentioned reveal that there are grounds for concern about the future wellbeing of the Wire Industry but there are indications that the present state of affairs is not without its reassuring side. Comparative figures from Ministry of Labour sources show us that in many respects the Wire Industry is on a par with or better than the average for industry generally in the matter of those statistics which reveal the health of an industry as it relates to its personnel. The number of new entrants from school as a proportion to the number already employed is the same as that for the average of all industry and the rate of labour turnover, the numbers entering and leaving the Industry, is no more than the average for industry generally. The size of the labour force in the Wire Industry has been extremely stable over a number of years and there is little evidence of short time working and unemployment. Wage rates and rates of earnings in the industry show a higher than average index, indeed a recent Manchester Guardian survey revealed that out of the more than a hundred separate classifications of industries that the Ministry of Labour uses only nine showed a higher rate of increase in agreed wage levels between 1948 and 1959. In the matter of actual earnings the Ministry of Labour Gazette informs us that 23 industries have average weekly earnings higher than those prevailing in the Wire Industry and in the matter of hourly earnings 39 have higher rates. There is no reason to suppose that the Industry is more hazardous than the average and it shares with the Iron and Steel Industry its good record of relative freedom from industrial disputes.

* * *

There are thus indications that at present the Wire Industry is reasonably well placed in its manpower situation but, as we have seen, unless more active steps are taken to increase the introduction into factories of more of the technical improvements that science is making available and to attract the more fully educated individuals this relatively satisfactory position may well be lost. It is a situation made the more urgent by events in the world at large. Since the First World War, and particularly since the Second, we have seen the emergence of many new nation-states. Many of these have been established in former colonial territories the economies of which were previously, in the main, subservient to the needs of the respective colonial powers. Now they have in large measure joined certain other countries such as some of those of South America and the Far East, as states who seek to throw off the economic shackles that appear to infringe their rightful sovereignty. Such countries in their search for self-realization often find it right to embark upon a programme of industrialization. Almost always the production of cotton goods is the first industry to be established and the cost of this to the Lancashire Textile Industry is only too well known. The next step is the one with which the Wire Industry is most closely concerned for it would seem that no self-respecting independent nation can do without an Iron and Steel Industry. Most emergent nations, considering no doubt the connection that exists between Iron and Steel Industry and the production of armaments, sooner or later see that a steel works is established and when this has been done the setting up of steel-using factories is a natural consequence. Unless then, the industries which are based on steel do not take full account of this development and act accordingly to keep themselves in a high state of efficiency there lies the prospect before them of a decline, the pattern of which is made only too plain by the present condition of the Cotton Textile Industry.

* * *

Certain particular steps need very early consideration. Firstly the enhancement of the status of learnerships in the Wire Industry. The youth who takes up an apprenticeship has, when he reaches the age of 21 an assured status. If the industry in which he received his training should pass through a time of diminished activity he can seek employment as a fitter or joiner or whatever his trade might

(*Please turn to page* 513)

Thin Film Anodic Aluminum Oxide Insulation on Round and Flat Wire

by Henry Walker
Permaluster, Inc.
Burbank, California

The insulation described, which becomes an integral part of the wire itself, does not increase the wire diameter. Hence, the coating developed by the anodic process, called "Permaluster", permits practically the full diameter of the wire to serve as an electrical conductor.

The use of a thin film of anodic aluminum oxide (Al_2O_3) has been gaining favor in the past few years with the advent of technical advances pushed on by demands for lighter, space saving, higher temperature insulators. In anodic aluminum oxide, we have a good insulator — good in the sense that it has many properties demanded by industry today. The film is thin and is a space saver.

* * *

Aluminum oxide insulation with a melting point of 3600 degrees F. has a voltage breakdown of about 30 to 40 volts per micron MM. (.00004"), is inorganic, will resist nuclear and neutron radiation, gamma rays, is chemically inert and will withstand temperatures below zero and higher than most conductive metals. The insulating film does not age nor deteriorate. It is used where space and weight saving is important and its high temperature operating range places it in a position above conventional wire insulating materials. Because of constantly changing technical advances, the use of this insulation on wire (Al_2O_3) has grown rapidly in the last few years. The insulating film is created anodically by an electro-chemical process; the anodes are in electrolytic solutions, and oxygen reacts with aluminum at the surface to form an aluminum oxide. Thickness may be controlled and varied by changes in current density, temperature, time, and so forth.

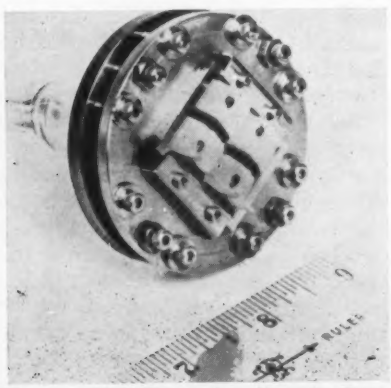


Fig. 1 — High Temperature Magnetic Transducer, with a four pole variable pickoff, has improved design, an increase in operating temperature, and a reduction in size due to the aluminum oxide insulated Permaluster wire.

* * *

During the past ten years of research, our chemists have developed a film that is highly flexible; can be continuously bent around a wire three to four times its own diameter; has a uniform film from the beginning to the end of the spool or coil with thickness control of the film from about .00007 to over one mil. It may be produced at speeds which justify prices low enough for commercial applications.

* * *

The advantages of using this type of insulation on wire are numerous: Space factor is almost zero as the film is created from the wire without adding additional materials.

* * *

Its heat dissipation and transfer characteristics are excellent; (it helps eliminate the need of cooling ducts or fans); it has the ability to carry heavy overloads in operations in superheated atmospheres under pressure and centrifugal force; it also eliminates space-consuming bulk insulation in windings because there is no other additional insulation or impregnation required. In tests already shown, it is insensible to oxygen and liquid azotes at low temperatures and will allow rapid evacuation of heat where there is a thermique screen created by the film.

Aluminum wire with this flexible aluminum oxide insulation is about half the weight for the same capacity as copper. It has been tested and approved by several major contractors and by leading manufacturers of electrical components in coils, cable, lead wire, motors, solenoids, transformers, nuclear pumps, capacitors, transducers, etc. Also, flat aluminum wire or narrow strip for coil winding has been produced in prototype quantities for hundreds of different types of coils, magnets, welders, clutch and break coils, solenoids, etc.

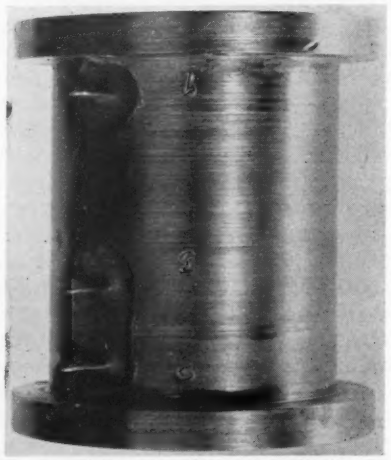


Fig. 2 — Unit used in deep well exploration using Permaluster anodic coated aluminum wire to overcome high temperature and pressure problems. The use of this wire has also substantially reduced the weight of the unit.

* * *

Where additional space factors are important, our company is also producing copper wire silver barrier, aluminum clad, other than anodic Al_2O_3 insulation. This same insulation is also being used on solid silver wire with aluminum cladding.

* * *

Where insulation values are dependent on the varying degrees of

(*Please turn to page* 514)

Fast Heating Accomplishes Uniform Spheroidizing of Heading Stock

by John Tschopp
Chief Metallurgist
The Chicago Screw Company
Bellwood, Illinois

A case history of fast, short cycle heat treatment in a pusher type furnace in the manufacture of fasteners.

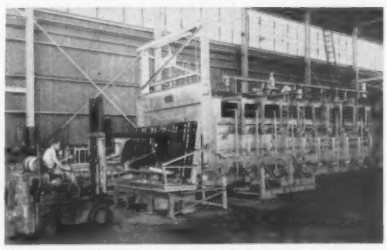


Fig. 1 — Operator loads two trays with coil stock prior to pushing them into the vestibule of the furnace. Before the trays go into the vestibule they will be placed in a horizontal plane at hearth level. * * * * * * *

A modern continuous pusher type furnace is consistently producing high spheroidized coil stock on a fast, short cycle.

* * *

The Chicago Screw Company, Division of Standard Screw Company, Bellwood, Illinois, one of the country's largest manufacturing plants for standard fasteners and screw machine products, recently put into operation a new 102 foot long, continuous pusher type furnace, for spheroidizing steel coil stock used for cold headed products. * * *

The furnace, engineered and built by **Surface Combustion, Division of Midland-Ross Corporation,** Toledo, Ohio, is heated by suction type radiant tubes and designed for flexible operation.

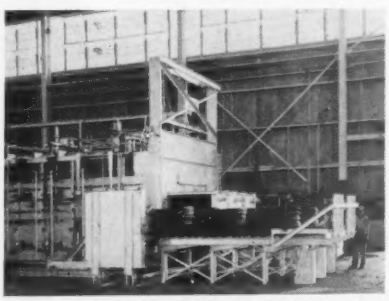


Fig. 2 — Two tray loads of coils have been extracted from the side door vestibule and pushed across the loading table by the pusher mechanism at the side of the furnace. This has placed one coil on the tilting mechanism and the operator is tilting the load so the arbor truck can remove them to the finished stock.

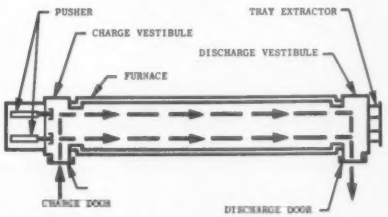


Fig. 3 — Trays are advanced through furnace and discharged by automatic mechanism, hydraulically actuated. * * * * * * *

Gas-tight in construction, this type furnace can be used for annealing on a number of heating and cooling cycles, with or without protective or re-active atmospheres. The furnace can also be used for carbonitriding, carburizing, carbon recovery and normalizing.

* * *

At the present time, the unit is specifically used for spheroidizing the coil stock. It consistently produces better than 85% spheroidization of pearlite in the structure of SAE-1038, 1041 and several low alloy steels. Operating on precise cycles, it is producing many tons of spheroidized coil during each 8-hour shift. One operator, with an arbor truck, operates the furnace and handles the coils in and out of storage.

Furnace Has Six Temperature Zones

Coils are stacked vertically in the building. The operator picks up one to three coils, depending on the weight, which varies from 400 pounds to 900 pounds each and up to 54 inches in diameter. These coils are placed on a heat-resisting cast 35-15 alloy tray that has been placed on a tilting mechanism at the loading vestibule. The 15' wide furnace takes two such tray loads

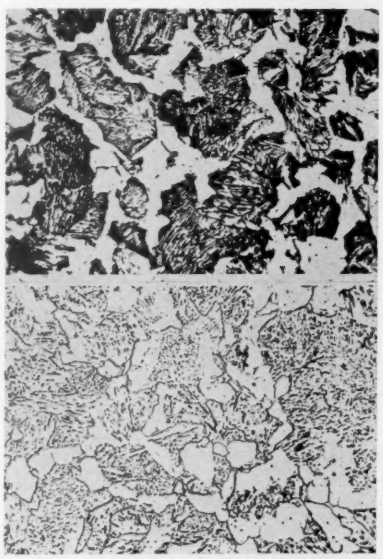


Fig. 4:
(a) Typical as rolled structure of 1035 steel as received from the mill (1250 X) * *
(b) Typical spheroidized structure of 1035 after fast cycle anneal in the continuous pusher furnace. (1250 X) * * * *

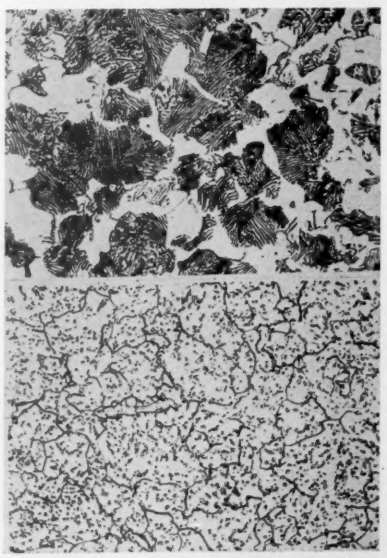
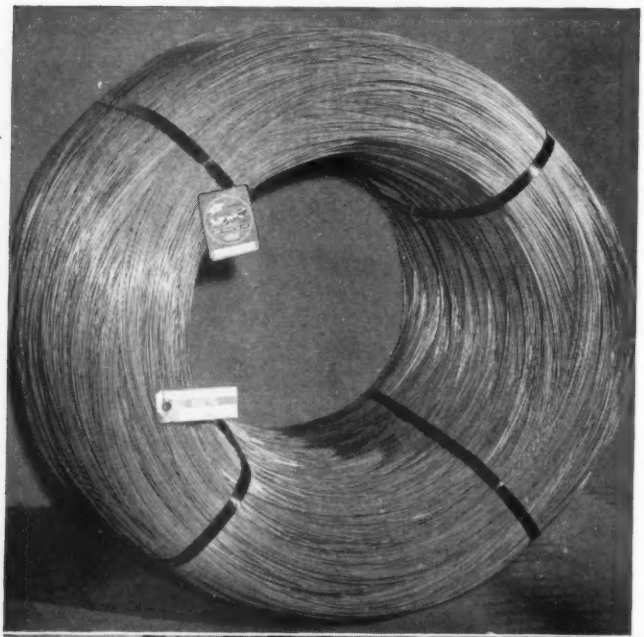
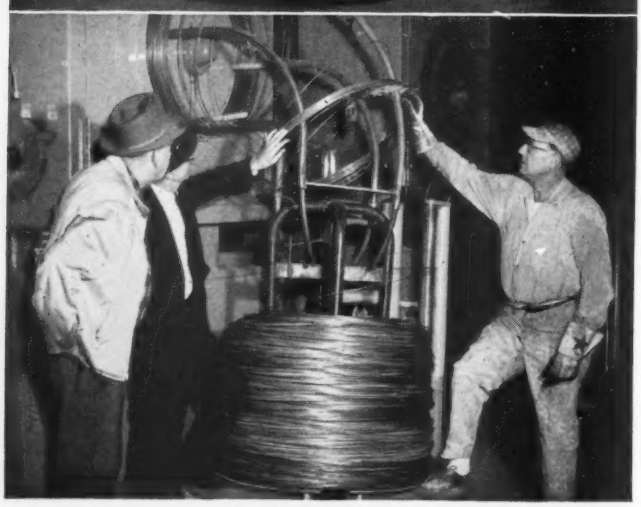


Fig. 5:
(a) Typical as rolled structure of 4140 steel as received from the mill. (1250 X). * *
(b) Typical spheroidized structure of 4140 steel after fast spheroidize anneal at 1300°F in the continuous pusher furnace. (1250 X)

(*Please turn to page* 515)

DSC-PORTSMOUTH "LAYER WRAPPED" LPR® COILS GIVE UPHOLSTERY SPRING MAKER OVER 40 MILES OF NON-STOP FABRICATING PER SETUP





LONG PRODUCTION RUN SNAG-PROOF COILS AVERAGE OVER 3200 LBS. .076″ HIGH CARBON WIRE

Improved "Layer Wrapping" Method Steps Up Fabricating Efficiency

DSC-PORTSMOUTH DIVISION, Rod and Wire Department, is in routine production and shipment of .076″ Upholstery Spring Wire in Long-Production-Run coils averaging over 3200 pounds in weight and over 40 miles in continuous length. One of these coils is shown in the adjacent photograph.

LONG PRODUCTION RUN COILS are not new. For years we have been regularly producing LPR's weighing up to about 4200 pounds. But it is something like crashing a "New Frontier" to produce spring wire LPR's as light as .076″ in gauge and weighing over 1½ tons—*and packaged in a way that virtually eliminates the chance of snagging or tangling in your pay-off operation.*

THIS CONTRIBUTION to WIREWORKING EFFICIENCY is one important result of *"layer wrapping" the strands as the big coils are built up.* This mill operation is shown in the lower photograph.

Would cost-reducing, Long-Production-Run, snag-proof coils fit into your brite wire fabricating picture? *For the complete story on LPR's and "layer wrapping", and answers to your questions regarding application, size-weight ranges and prices, call your DSC Customer "Rep" or write: Detroit Steel Corporation, Box 7508, Detroit 9, Michigan.*

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Heat Aging of Chemically Cross-Linked Polyethylene

by A. E. Tarbox
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Union Carbide Plastics Company
Division of Union Carbide Corporation
Bound Brook, New Jersey

This paper was presented at the Ninth Annual Symposium on Technical Progress in Communication Wires and Cables held at Asbury Park, N. J., November 30-December 2, 1960, under the auspices of the U. S. Army Signal Research and Development Laboratory of Fort Monmouth, N. J.

Introduction

Chemically cross-linked polyethylene is being introduced to industry as a new material. While this vulcanizate based on polyethylene and medium thermal black has become of interest chiefly to wire and cable manufacturers during the past few years, it has more recently generated interest among the rubber fabricators. At present, two U. S. Patents exist for cross-linked polyethylene. U. S. Patent No. 2,888,424, assigned to the General Electric Company, is concerned with cross-linked polyethylene with certain peroxides and defined fillers. U. S. Patent No. 2,825,570, assigned to Hercules Powder Company, is concerned with cross-linking of polyethylene in general.

* * *

As a supplier of resins, it must be expected that Union Carbide Plastics Company would be interested in the future of chemically cross-linked polyethylene. Our interest has been further strengthened by knowledge of its properties. This has resulted from a study of the many variables which affect chemically cross-linked polyethylene. Properties, formulations, and methods of fabrication have been previously discussed.*

* * *

It is generally well known that chemically cross-linked polyethylene and its compounds have good chemical and stress-crack resistance, high tensile and tensile impact strength, and improved dimensional stability at elevated temperatures. In the area of high temperature service, however, there has been little specific information available on the retention of properties of these compounds. This paper discusses the effect of heat aging on some of the more critical properties of chemically cross-linked polyethylene.

Preparation of Samples

The materials discussed in this paper are based on a low-density (0.92) polyethylene resin (Bakelite DYNH), a high-density (0.95) polyethylene resin (Bakelite DMDA-6201) and an experimental ethylene copolymer (0.93 density).

* * *

The effect of antioxidant was studied by preparing materials with and without antioxidant and by varying the amount used.

* * *

The compounds as shown in Table I were all prepared by fluxing in an eight-pound Banbury and sheeting on a two-roll mill. Milled sheet was used for molding 75 mil plaques in all cases except sample "I", which was double pressed from granules. The plaques were cured between cellophane in a stainless steel mold ten minutes at 175 deg. C. They were then aged up to 56 days in an air circulating oven at 100 deg. C., 120 deg. C., and 136 deg. C. The plaques were also aged for 48 hours at 175 deg. C. and two and four hours at 220 deg. C. The samples were tested before and after aging for tensile properties, density, durometer, room temperature compression cut-through resistance, brittleness temperature and dissipation factor and dielectric constant. They were also graded for appearance as excellent, good, fair, poor or very poor.

TABLE I

CHEMICALLY CROSS-LINKED POLYETHYLENE FORMULATIONS

	Group 1			Group 2		Group 3				
	A	B	C	D	E	F	G	H	I	
Low-Density Polyethylene (DYNH)	100	100	100					100	100	
High-Density Polyethylene (DMDA-6201)				100	100					
Ethylene Copolymer						100	100			
MT Black (1)	100	100	100	100	100	100	100			
FEF Black (2)								50		
"Santonox" R (3)			.5	.5	.6	.1	.5	.1	.1	
"Agerite" Resin D (4)		.5								
"Di-Cup" R (5)	3	3	3	3		3	3	4	2	
"Varox" (6)					6					

(1) MT Black "Thermax" -- R.T. Vanderbilt Co.
(2) FEF Black "Staten" N -- Columbia Carbon Co.
(3) "Santonox" R, Monsanto Chemical Company, 4,4' Thiobis (3-methyl-6-t-Butyl phenol).
(4) Product of R. T. Vanderbilt Company - Polymerized Trimethyl dihydroxyquinoline.
(5) Cross-linking agent, DiCumyl Peroxide. Product of Hercules Powder Company.
(6) Cross-linking agent, 50 percent active material containing equal parts of 2,5-bis (tertiary butyl peroxy) - 2, 5-dimethyl hexane- and an inert mineral carrier; R. T. Vanderbilt Company.

Conclusions

Chemically cross-linked polyethylene requires antioxidant protection for use at elevated temperatures. Antioxidants extend the life and raise the use temperature of chemically cross-linked polyethylene so that they can be made to withstand approximately 136 deg. C. (246.8 deg. F.) for upwards of 1000 hours. An antioxidant is required at a ratio of approximately 6:1 peroxide to antioxidant for adequate protection at these temperatures. At 175 deg. C. or above, chemically cross-linked polyethylene stabilized with "Santonox" R or "Agerite" Resin D fails rapidly.

* * *

Long-term aging at elevated temperatures degrades chemically cross-linked polyethylene at a rate governed by the temperature and the per cent active antioxidant present. Specifically, aging lowers the tensile properties and the cut-through resistance at room temperature; it raises the density and and the brittleness temperature. Aging does not affect hardness. As

* "Chemically Cross-Linked Polyethylene for Wire and Cable—Progress Report", by M. M. Suba, L. G. Imhof, A. E. Tarbox, F. J. Crimi, Union Carbide Plastics Company, presented on October 13, 1959 at Cleveland, Ohio.

the material oxidizes, the density rises. This oxidation is also responsible for increases in dissipation factor and dielectric constant.

Discussion

The materials discussed in this study were all compounded in an "0" size Farrel Burmingham Banbury using neutral rotors during initial fluxing. Cooling water was added for final fluxing. Approximately ten minutes was used for fluxing and two minutes for final compounding after the addition of the peroxide, with the exception of samples "H" and "I"; the peroxide was added at the beginning of the cycles for the latter materials. All materials were sheeted from a 24-inch diameter equal speed mill (surface temperature 90-125 deg. C.) after receiving four end passes. The sheet was then cut into squares and allowed to cool in air.

* * *

The following tests were conducted on 75 mil compression molded plaques cured 10 minutes at 175 deg. C:

***Tensile Properties*—(Not an ASTM Test). Tests conducted on ½ inch dumbbell shaped specimens. Jaw separation speeds were 2 inches/minute for tensile and 20 inches/minute for yield.**

***Density*— (Column) — ASTM D1505-57T.**

***Durometer Hardness*— "A" — ASTM D676-55T, "D" — ASTM D1484-57T**

***Brittleness Temperature*—ASTM D746-57T.**

***Dissipation Factor and Dielectric Constant @ 1 MC*— ASTM D150-54T. This test was made on a 1″ x 1″ x .075″ sample for each material and was used to show trends only.**

***Compression Cut-Through Resistance*—Bell Lab Test Procedure KS-4691, Method 5, Shear Test. This test, conducted at room temperature, is intended to measure degradation occurring after extended periods of aging. Test consists of placing 1½ inch squares of material at least 75 mils thick under the load of a ½ inch wedge with a .030 inch face. Load is adjusted so that a failure occurs 15 seconds after load is applied. Load is calculated in pounds per inch of width.**

***Appearance*—In this arbitrary test, samples were graded as excellent to very poor. It was found that upon aging, the surfaces of samples without antioxidant protection become dull and eventually craze; at this point, the material becomes brittle.**

* * *

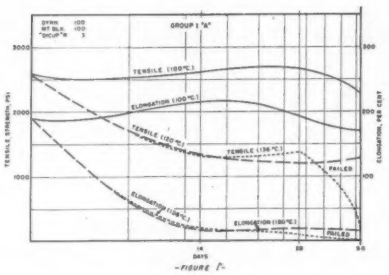


FIGURE 1

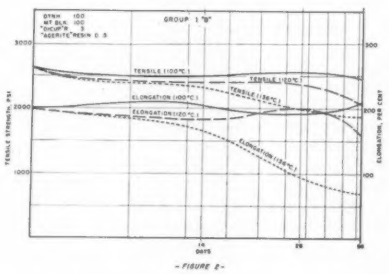


FIGURE 2

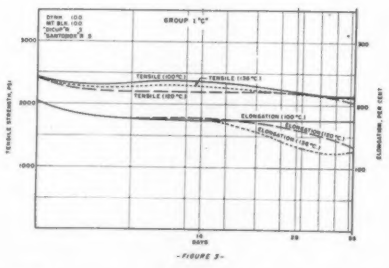


FIGURE 3

The curves found in the figures accompanying this paper were obtained by connecting plotted points rather than by using straight lines.

* * *

The effects of aging at elevated temperatures and the stabilizing action of antioxidants on three low-density polyethylene (DYNH-MT Blk) compounds are shown in Figures 1, 2 and 3. Figure "1" represents no antioxidant; "2", .5 phr of "Agerite" Resin D, and "3", .5 phr of "Santonox" R. Figure 1 shows good retention of tensile properties at 100 deg. C. (90 per cent of original tensile and elongation retained after 56 days). But at an elevated temperature of 120 deg. C., the sample retained only 50 per cent of original tensile strength and 7 per cent of elongation after 14 days. Complete loss of tensile properties is experienced by this unstabilized material after 28 days at 136 deg. C.

* * *

The degradation of appearance with aging for this compound is shown in Table 2 (Sample "A"). In this particular case the sample lost its gloss after 28 days at 120 deg. C.

* * *

In direct comparison, Figures 2 and 3 show the stabilizing effects of .5 phr of antioxidant, particularly the retention of tensile properties at 100 deg. C. and 120 deg. C. In Figure 2, sample containing "Agerite" Resin D retained 94 per cent of tensile strength and 100 per cent of original elongation after 56 days at 100 deg. C.; 80 per cent retention of both materials is maintained at 120 deg. C. after 56 days, but at an elevated temperature of 136 deg. C., the elongation drops down to 35 per cent.

* * *

Figure 3, sample containing "Santonox" R, shows similar stabilizing effects. Good retention of tensile properties is demonstrated at 100 deg. C. and 120 deg. C., while at 136 deg. C., tensile properties are good up to 14 days and then drop off gradually, but without failure up to 56 days of the test.

* * *

A study of two high-density polyethylenes ("D" and "E") stabilized with .5 phr of "Santonox" R is shown in Figures 4 and 5. Sample "D", shown in Figure 4, was cross-linked with "Di-Cup" R, while sample "E" (Figure 5) was cross-linked with "Varox." The tensile properties of these materials generally improved on aging

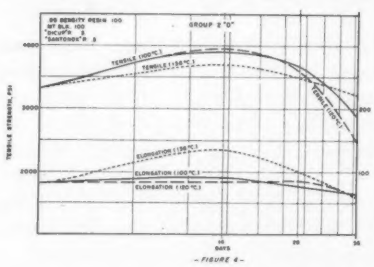


FIGURE 4

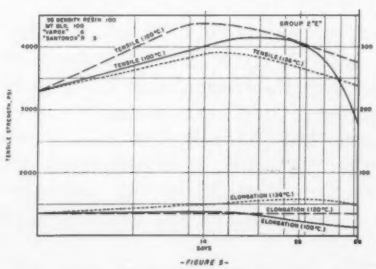


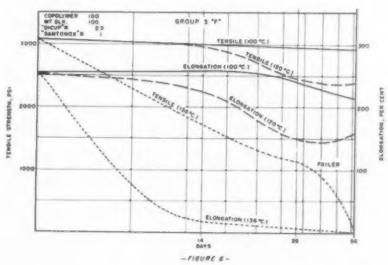
FIGURE 5

up to 14 days and then dropped off to approximately their original

level after 56 days at 136 deg. C. It would appear that since the tensile properties of the high-density compounds increased on aging, they were improperly cross-linked initially; however, half life characteristics of both peroxides indicate that 10 minutes at 175 deg. C. is more than sufficient for complete cross-linking.

* * *

The effects of aging and the protective effects of antioxidants on two compounds based on an experimental ethylene copolymer and equal parts of MT Black are illustrated in Figures 6 and 7. In Figure 6, Sample "F" with .1 phr of "Santonox" R retains about 95 per cent of its original tensile strength



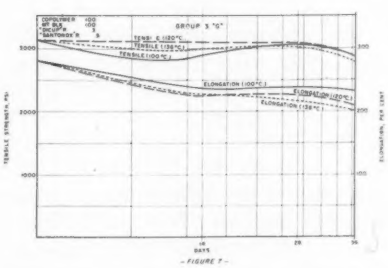


TABLE II

APPEARANCE

Condition	A	B	C	D	E	F	G	H	I
212°C	Ex.	Ex.	Ex.	Ex.	Ex.	Ex.	Ex.	Ex.	Ex.
Aged 14 days	Ex.	Ex.	Ex.	Ex.	Ex.	Ex.	Ex.	Ex.	Ex.
100°C 28 days	Ex.	Ex.	Ex.	Ex.	Ex.	Good	Ex.	Ex.	Ex.
56	Ex.	Ex.	Ex.	Ex.	Ex.	Good	Good	Ex.	Ex.
Aged 14	Fair	Ex.	Ex.	Ex.	Ex.	Poor	Good	Good	Good
120°C 28	Poor	Ex.	Ex.	Good	Fair	Poor	Good	Good	Fair
56	Poor	Ex.	Ex.	Good	Good	Poor	Fair	Good	Fair
Aged 14	V.Poor	Ex.	Ex.	Good	Good	Poor	Ex.	Good	Fair
136°C 28	V.Poor	Ex.	Ex.	Good	Good	Poor	Good	Good	Poor
56	V.Poor	Ex.	Good	Good	Fair	Poor	Good	Good	V.Poor
Aged 2 hours	V.Poor	V.Poor	V.Poor	V.Poor	V.Poor	Poor	Poor	Poor	V.Poor
Aged 6 hours	V.Poor	V.Poor	V.Poor	V.Poor	V.Poor	Poor	Poor	Poor	V.Poor
175°C 48 hours	V.Poor	V.Poor	V.Poor	V.Poor	V.Poor	Poor	Poor	Poor	V.Poor

and 80 per cent of its elongation after 56 days at 100 deg. C. However, after 56 days at 120 deg. C., only 78 per cent of tensile strength and 62 per cent of its elongation are retained. At 136 deg. C. after 56 days, the material has lost all of its tensile properties. In Figure 7, Sample "G" with the higher antioxidant content (.5 phr "Santonox" R) exhibits a much better degree of property retention than the sample with less antioxidant. The improved protection offered by the higher content is also demonstrated by the appearance of the aged samples (Table II).

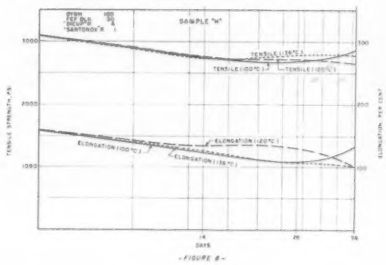


Figure 8 represents the effects of aging on the tensile properties of a low-density polyethylene (DYNH-FEF Black) composition (Sample "H"). FEF Black ("Statex" M) is a structural black from Columbia Carbon Co. and is excellent for chemical cross-linking where higher percentages of resin are desired. While only .1 phr of anti-oxidant was used with this formulation, it is believed that the fine particle structure black by itself offers some protection on aging. This is also shown to be valid in the appearance of the sample (Table II). Figure 8 illustrates that about 90 per cent of the original tensile strength and 70 per cent of the original elongation is still retained after 56 days at 136 deg. C.

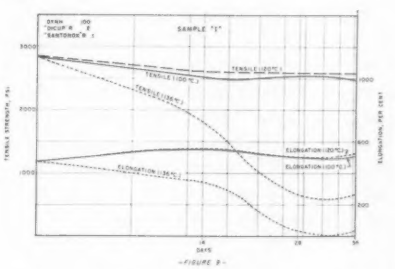
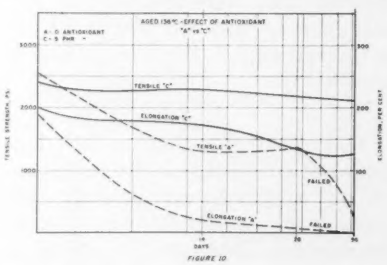


Figure 9 is a study of a chemically cross-linked, unfilled, low-density polyethylene (DYNH) with a minimum amount of antioxidant (.1 phr). At 100 deg. C. and 120 deg. C. Sample "I" retains almost 90 per cent of its tensile strength and all of its elongation up to 56 days. Gradual degradation of tensile properties occurs at 136 deg. C. Rapid degradation occurs after 14 days and after 56 days the material is actually beginning to carbonize and turn black. Additional studies using a higher antioxidant content are in progress to determine protective effects of antioxidants on unfilled compounds.

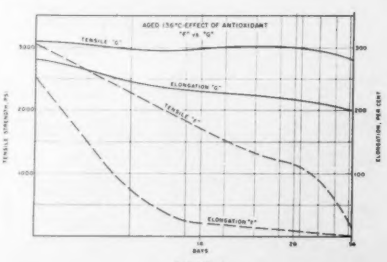
The protection provided by antioxidants is clearly illustrated in Figure 10 which compares Sample "A", containing no antioxidant, with Sample "C", containing .5 phr of "Santonox" R, where samples were aged at 136 deg. C. While sample "C" still retains 83 per cent of its tensile strength and 65 per cent of its original elongation after 56 days, the unstabilized material drops off rapidly after 28 days to



zero after 56 days.

* * *

The results of higher antioxidant content on ethylene copolymers, aged at 136 deg. C., is shown in Figure 11. Sample "G" (.5 "Santonox" R) retains 89 per cent of its tensile strength and 74 per cent of its elongation after 56 days whereas Sample "F" with only .1 phr of antioxidant completely failed.



To summarize the discussion on tensile properties, it is obvious that chemically cross-linked polyethylene needs an antioxidant to protect its tensile strength and elongation for prolonged use at elevated temperatures. From the Figures presented in this connection, it appears that an antioxidant content of .5 phr or above is most suitable to afford the necessary protection. Of the antioxidants investigated, none was effective in preventing embrittlement at aging temperatures above 175 deg. C. as materials become brittle at 175 deg. C.

* * *

Attention has already been given to Table II which describes the effect of aging on appearance. Degradation of appearance, i.e., loss of surface gloss, and eventual crazing or cracking of the surface, is caused by oxidation since samples with the most antioxidant exhibit the best appearance after 56 days of testing. Unfilled materials change color from white and clear to amber, and finally black and opaque. The deterioration in appearance is also accompanied by a degradation of other physical properties.

* * *

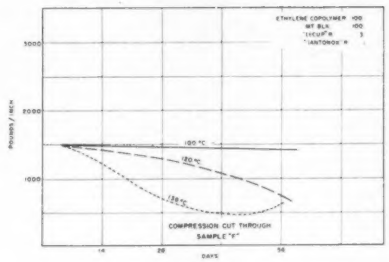
The effect of aging on the density of cross-linked polyethylene shows a direct correlation with appearance as the samples having the highest final density exhibited the poorest appearance. As a specific example, the densities of the aged low-density polyethylene (DYNH-MT Black) compound containing no antioxidant are tabulated against appearance in Table III. This correlation between density and appearance is not unexpected since density increases directly with the degree of oxidation that is occurring.

TABLE III

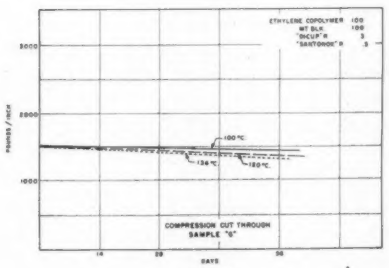
SAMPLE "A" DYNH-THERMAX-NO ANTIOXIDANT

Condition		Density	Appearance
Original		1.2162	Excellent
Aged 100°C	14 days	1.2162	Excellent
	28 days	1.2173	Excellent
	56 days	1.2173	Excellent
Aged 120°C	14 days	1.2529	Fair
	28 days	1.2679	Poor
	56 days	1.2850	Poor
Aged 136°C	14 days	1.2663	Very Poor
	28 days	1.2732	Very Poor
	56 days	1.2741	Very Poor

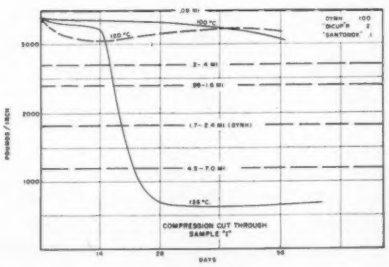
The effect of aging on the room temperature compression cut-through resistance of chemically cross-linked polyethylene is similar to the effect observed on tensile properties. Minimum degradation as measured by cut-through resistance is obtained by adequate quantities of antioxidant. Figures 12 and 13 illustrate this point by comparing Sample "F" (.1 phr of "Santonox" R) with Sample "G" (.5 phr of the same antioxidant). As can be seen, the compression cut through after oven aging of Sample "G" remains fairly constant at all temperatures compared to Sample "F" (with less antioxidant) which drops off at 120 deg. C. and 136 deg. C.



– FIGURE 12 –



– FIGURE 13 –



– FIGURE 14 –

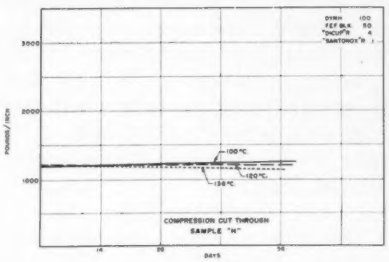
Figure 14 also indicates this relationship by showing the compression cut-through resistance of a cross-linked, unfilled, low-density polyethylene (DYNH) with insufficient antioxidant. In testing for this property at room temperature, the sample aged at 136 deg. C. falls off rapidly after 14 days.

* * *

It is interesting to note in Figure 14, the relationship of chemically cross-linked, unfilled, low-density polyethylene (DYNH) with other polyethylenes of different molecular weights and varying melt indices. Chemically cross-linked polyethylene has almost double the cut-through resistance of its uncross-linked counterpart and is close to that of a high molecular weight resin with a melt index of .08.

* * *

In the property of cut-through resistance, carbon black has little or no reinforcing action on cross-linked polyethylene and actually lowers its room temperature compression cut-through resistance.



– FIGURE 15 –

This is illustrated by Figures 14 and 15 where the initial room temperature cut-through resistance of the chemically cross-linked, unfilled, low-density polyethylene (Fig. 14) is considerably higher than that of a filled, low-density polyethylene (Figure 15).

* * *

Brittleness temperature is also affected by aging but only with chemically cross-linked materials which do not have sufficient antioxidant protection. Table IV shows the brittleness temperature results obtained on the low-density (DYNH) compounds, Samples "A", "B" and "C". The test does not measure small differences and was conducted with a limited number of samples to show brittleness temperature trends. Tests on Sample "A" were only carried out until all samples failed. While the effect of aging on the brittleness of other samples besides those in Group 1 was not determined, it is expected that the results would be very similar for the other materials.

TABLE IV

BRITTLENESS TEMPERATURE*

		A	B	C
Original		-60°C.	-60°C.	-60°C.
Aged 100°C	14 days	-60°C.	-60°C.	-60°C.
	28 days	-65°C.	-60°C.	-60°C.
	56 days	-60°C.	-60°C.	-55°C.
Aged 120°C	14 days	-55°C.	-65°C.	-55°C.
	28 days	-50°C.	-60°C.	-60°C.
	56 days	-45°C.	-65°C.	-50°C.
Aged 136°C	14 days	-45°C.	-55°C.	-55°C.
	28 days	-45°C.	-65°C.	-60°C.
	56 days	-45°C.	-65°C.	-55°C.

* Temperature below which samples fail.

The electrical stability of chemically cross-linked compounds also depends on antioxidant protection. It is well recognized that oxidation degrades the electrical properties of normal polyethylene and chem-

(*Please turn to page* 516)

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E-1-C	.015" to .050" diameter	J-6-ADU	.035"x1/2" to .035"x1 1/4" strip
J-3-C	.031" to .064" diameter	E-C	.032" to .128" diameter
J-4-C	.064" to .128" diameter	AD-3	.187" to .375" diameter
J-45-C	.080" to .204" diameter	AD-4	.250" to .500" diameter
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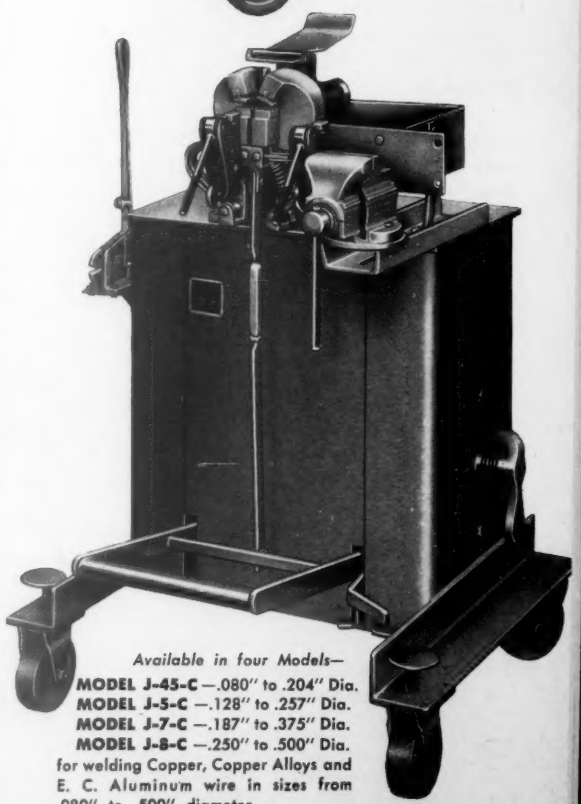

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High Vacuum Annealing: Its Use in Steel Wire Drawing and Cold Rolling Mills

by
Dr. Werner Herdieckerhoff

Translated by Jerome W. Howe of Worcester, Massachusetts, from an article in the June, 1960 issue of Draht-Welt.

The products of steel wire drawing and cold rolling mills require for processing and finished products a clean surface, whether the steel wire or strip has a high or low carbon content. For this the hot rolled products are freed from adhering scale by means of appropriate working methods. Only in this condition can they be subjected to drawing, cold-rolling or cold-forming. As well known, cold-working causes an additional hardening of the material, which, according to its composition, can be carried so far that a further reduction of cross-section is no longer possible. At this point a method of annealing must be applied to restore the initial state of the material, so the required cold-shaping may be continued on, if the finished dimensions have not been reached or if the product does not yet correspond to the ordered quality specifications. This annealing of the material is called, according to the point of time when it is undertaken, intermediate (process) annealing or final annealing.

* * *

As drawn wire and cold rolled strip will have received a more or less bright surface through the cold-working, care should be taken to preserve this bright surface during the heat treatment, in order to avoid having further either to clean or descale the material.

* * *

The development of the bright annealing or cold formed products is so many-sided that it only can be very briefly sketched. Fresh researches must be carried on continuously to adapt the products in question to the rapidly tightening quality specifications of surface conditions and mechanical properties.

* * *

After the suitability of annealing under protective atmosphere was once recognized, buffer gas was quite commonly employed for the production of bright surfaces; all efforts were then directed toward perfecting the atmosphere generating plants to obtain the dryest possible gas and to conduct such a gas into the annealing furnace under constant pressure. Development work ran parallel with these efforts. This had as an aim greater uniformity of temperature in all parts of the annealing plant, for only thereby could uniformity in the mechanical properties demanded by the consumers be attained. More suitable burner arrangements and new-style sources of heat in conjunction with built-in gas circulators to circulate the protective gas were the chief features, which led to a noticeable improvement and equalization of temperature in the annealing pot and consequently to a greater uniformity of the mechanical properties of the annealed steel.

* * *

For many purposes such buffer gas installations with and without circulators have stood the test and also have made it possible to meet quality specifications. For much previous production the prevailing arrangements either did not satisfy, or else the finishing had to be achieved with an expenditure of time and energy lying close to the limit of economy, and consequently had little appeal for many manufacturers. All of this work now can be carried out by annealing under vacuum and with those important savings that a high vacuum annealing plant provides. The use of such a plant has brought a number of additional advantages, on which the following is a report.

Mirror-Bright Annealing

If wire or strip is annealed mirror-bright in the protective gas furnace, in most cases the result, even noticeable to the eye, is unequivocally good. Intensive investigation of the surface, however, shows that the annealed material is often covered with an invisible film and so does not have a clean metallic surface. By vacuum annealing all lubricating agent residues adhering to the annealing material, so far as it is gaseous under high heat, are completely removed, so that not only an extra bright but also a perfectly dry annealed product results. As an example, the inlay wire for wire glass may be cited. If this wire should carry with it even traces of grease or moisture on its surface, the inlaying of mesh made of this wire would occasion minute explosions that would lead to gas inclusions or bubbles along and chiefly at the wire crossings. With vacuum annealed wire such bubble formation will not occur, provided a lubricant is used that will be completely vaporized at the annealing temperature.

Galvanizing or Tinning Without Previous Pickling

A dry surface is of even greater importance if the material is later to be galvanized or tinned. Commonly the galvanizing or tinning is preceded by a weak pickling in order to clean and degrease the surface. With vacuum annealed material this is unnecessary provided a water-soluble drawing lubricant is used. This innovation is especially interesting in the case of fine wire, which can be processed in fast running galvanizing plants to which a simple fluxing bath is connected. If the material, particularly wire, is drawn through stearate or soap, a simple dipping in weak hydrochloric acid will attain this result. Here the calcium is changed to cal-

cium chloride in the hydrochloric bath. Good results also are obtained with wire drawn to about 2.5 mm in soap and then given a weak wet drawing to around 2.2 mm. Vacuum annealed wire shows a particularly brilliant surface after galvanizing, which is more attractive and durable than that of pickled wire.

Uniform Strength and Elongation Values

A uniform strength with equal elongation is attained in the vacuum because the heat is applied only through radiation. Uniformity of annealing is especially important in wire to be woven and in deep drawing from strip. It has been found that by no other annealing method can uniform deep drawing values be obtained as by vacuum annealing.

Annealing of Coppered Wire Without Damage To the Copper Coating

The production of coppered steel wire is laborious by the earlier processes. If it is put into ordinary annealing pots the copper coating is ruined, in appearance at least. In most cases this copper film has to be replaced and the wire given a light extra pass. Besides causing additional cost, the process can not prevent a rise in the strength values. It is interesting that with high vacuum annealing neither the color nor the quality of the copper film are affected as long as the annealing temperature does not exceed 1,150°F. In this way a faultless coppered wire is obtained that has maximum flexibility.

Saving of the Intermediate Pickling of Grease-Clean Drawn Wire

Often it is very disturbing to find that with grease-clean drawn wire a hard reddish appearing grease film remains that interferes with finish drawing. The elimination of this grease film by customary pickling processes runs into difficulties. In such cases the annealing under vacuum is a distinct advantage. So long as the lubricants remain on the wire as unvaporizable matter, they are soft and do not hinder finish drawing. The intermediate pickling then can be wholly saved.

Elimination of Rust— And Sull-Coat Color

If scale forms in the course of the manufacture or stock becomes rusty in prolonged storage then vacuum annealing is a good means for relieving both defects. An annealing under vacuum at 1,110°F will remove all annealing color, and at 1,290°F the rust also will be dissolved. Strongly rusted stock shows a slightly scarred surface after the annealing.

Oxidizing Annealing (Blueing)

For the blueing of wire and strip two different processes have been developed which are carried out in vacuum furnaces.

* * *

I. By the controlled oxidation of iron, it is aimed to give wire and strip a predominantly uniform corn-flower blue color. Fundamentally it suffices to have air at the desired temperature—about 570°F —circulated about the whole of the surface of the stock to be blued. Up to recently, in the blueing of strip steel, continuous annealing furnaces were used. The cost of the blueing by this method now has become too high, especially for baling hoops, and for the blueing of wire it is completely uneconomical. Attempts have been made to blue the wire or strip in coils, with the annealing stock deposited in closed containers. But these efforts could give no satisfactory results because in furnaces of conventional construction the three determining conditions could not be satisfied.

* * *

For surface oxidizing, especially for the blueing of metal in closed containers, it is prerequisite that:

(a) the stock to be blued shall have a perfectly clean metallic surface;
(b) the temperature shall be equal in the whole stack; and
(c) the whole surface, thus every separate wire or strip winding, must be surrounded with pure circulating oxygen.

* * *

This is accomplished in the above-mentioned process in the following manner:

For (a) the prescribed condition —that the stock to be blued be perfectly clean surface—it is found that with high vacuum annealing this is no longer literally true. The process works entirely satisfactorily even if the annealing stock carries with it lubricating agents from the preceding cold-forming. The stock is acted upon by attached vacuum pumps. As soon as the lubricating agents are gasified they are sucked out. For the preceding cold-forming, only lubricants should be used that will vaporize in high vacuum under a limit of 570° F. If the vaporizing temperature is above this, the temperature has to be raised above the blueing point, which entails loss of time, because after the removal of the lubricant, one must wait until the whole charge has cooled again to 570°F. The outcome however is then the attainment of a completely dry, clean material.

* * *

For (b) the color of the oxide is very strongly dependent upon the temperature. If differences in temperature exist in the material to be blued, this leads to appreciable differences in the coloring; the annealed stock becomes mottled. Since temperature variations of 18°F are too great for the purpose, annealing pots of usual construction with unavoidably greater fluctuations are useless. The vacuum in the annealing pot is not in itself sufficient; moreover, the enclosing furnace must also stay under vacuum, because only then is perfect uniformity of temperature obtainable.

* * *

For (c), for oxidizing, pure oxygen is used. The introduction of air into a closed container is not sufficient. Only the oxygen content of the air would have any effect. A block of nitrogen remains behind that interferes with further oxidizing. On the other hand, it would not be sufficient just to introduce pure oxygen, if this is not forced in under high pressure. If, with the method under consideration, pure oxygen is flooded into the container from which the air has been exhausted, then it fills all the free space with a pressure of one at-

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Dow Corning CORPORATION MIDLAND, MICHIGAN

mosphere and thus reaches the total surface of all convolutions of the wire or strip coils.

* * *

Special problems for this process are met, for example, in the manufacture of florist's wire, packing hoops, deep drawing strip, fishing chain, etc.

* * *

If cold rolled material is annealed simultaneously, then the above method must be altered in the direction of heating up to about 1,290°F. There is then the possibility of degreasing, annealing and blueing in one operation (blueing only if the temperature is brought back again to 570°F). With wide strip the lower limit of the field of application is with coils of 0.5 mm sheet. If the sheet is still thinner there is no choice but to loosen the bundles before the operation, in order to improve access to the coiled material.

* * *

II. An entirely new manner of blueing can be carried out with wire and loosely coiled strip by the following method:

* * *

The blue coloring of the strip or wire is an interference color having a certain definite thickness of the scale layer. It is therefore not simply dependent upon the temperature. If a lot of oxygen is introduced at random to the material to be blued, then the oxide forms in the interference color, blue, with temperature at about 570°F. If higher temperatures exist, then no more oxygen must be furnished than is necessary for the building up of the blueish scale. In other words, the injection of oxygen must be throttled.

* * *

Realization of this has led to practical results. If it is desired to anneal steel and blue it simultaneously, the procedure is as follows: the material is annealed in the high vacuum of 1,290°F, while at this temperature a stream of neutral gas—argon or nitrogen—is introduced. Then the annealing pot is placed in the cooling pit, so that during the cooling off the gas contracts and a partial vacuum results. When in the cooling process a temperature of 750° to 930°F is reached, this partial vacuum is filled with pure oxygen. The neutral gas remaining in the muffle has the function of distributing the oxygen absolutely evenly, and the result is a uniform blue coloring of the whole of the stack of wire or loosely coiled strip.

* * *

One must discover by the trial of several charges just what temperature will give the most desirable blue coloring. This will depend upon the existing vacuum and the surface of the material charged. The above-mentioned temperatures are therefore only to be taken as a guide. In this manner the work can be done much more quickly than the blueing of closely coiled strip steel and wide strip by Method I, because the process can be continuous, and it is not necessary to wait until a uniform temperature of 570°F prevails throughout the charge. On the other hand, the method is useful only for wire and loosely coiled strip or stampings, because the oxygen is not introduced under high pressure as in the method first described.

* * *

With these two processes the cost of blueing can be lowered appreciably. The blueing of a ton of strip steel requires about 130 KWH, and some oxygen. There are no other costs. This represnts a cost saving of about 70% as against the method of blueing in the continuous furnace. On the whole, no additional costs are involved in the blueing of wire. Annealing entails costs as usual; blueing requires some neutral gas and oxygen; costs that are reckoned for the ton are meaningless.

* * *

Both processes have been introduced in a number of plants and have proved successful.

* * *

In conclusion it may be said that in a mill for steel wire or cold rolled processing, a vacuum plant for various purposes will have great utility. If it is believed that the particular tasks for this method do not overburden the furnace, the plant can also be used for partial vacuum annealing, buffer gas annealing and black annealing. The vacuum pump is not connected. For partial vacuum annealing the

(*Please turn to page* 518)

Developments in 300-600 Volt Miniature Flexible Insulated Lead Wire for Use at 700° - 2000° F

by Welton D. Parker
Product Supervising Engineer
Technical Department
Rockbestos Wire & Cable Company
Division of Cerro Corporation
New Haven, Connecticut

This paper was presented at the Ninth Annual Symposium on Technical Progress in Communication Wires and Cables, held at Asbury Park, N. J., from November 30 through December 2, 1960, under the auspices of the U. S. Army Signal Research and Development Laboratory of Fort Monmouth, N. J.

Introduction

Two or three years ago, a small, flexible insulated wire capable of continuous performance at, say, 800°F. at 60,000 feet altitude for something over 1000 hours would have satisfied a much larger proportion of total requirements for high temperature wire than it would today. Advances into space carry with them corollary advances in performance requirements of the insulated electric conductors serving as nerves of the various space vehicles.

* * *

When the title of this paper was conceived in June of last year, the upper temperature limit considered, 2000°F., seemed high. In August, as this paper is being written, the writer would like to be dealing with developments in wire for use at up to 3000°F.—for such are the more recent demands of users. While Rockbestos is thinking and working in that area, the present discussion will be confined to the limitations implicit in the title.

* * *

Consideration of a flexible insulation to operate for more than a temporary overload interval at temperatures above 700°F. leads to a search for materials having temperature characteristics at levels above those of polytetrafluoroethylene and the silicones. By the existing nature of things, such materials must be inorganic.

* * *

Most high temperature wires described in the literature appeared to have rigid ceramic type insulation, limited to types suitable for coil winding for transformers and rotating equipment or for use at quite low voltage.

* * *

Our more than forty years' experience in manufacture of high temperature wire and cable for commercial and military use led us to seek an insulation which would be flexible as made and after exposure to temperatures of 700°F. and higher.

Procurement and Evaluation Of Materials

Available technical handbooks, technical and trade publications and research reports were scrutinized for leads to materials which showed evidence of promise as insulating coverings, impregnants or sealants with the desired properties. Consequently, a great number of samples of various materials were obtained for evaluation individually or in combinations with each other.

* * *

Considerations of efficiency and economy in use of manpower led to evolution of techniques for preliminary screening of these items and combinations.

* * *

Liquid candidates for coatings and sealants were applied to small slabs of thin sheet stainless steel, dried or cured to suitable films, and subjected to the desired environmental conditioning. Indications of performance capabilities were provided by hand flexing the steel and observing any tendencies of the films to crack or flake. Behavior of the films in contact with various fluids and atmospheres was readily observed by exposure of the coated slabs. This preliminary screening rapidly identified the relatively more promising coating materials.

* * *

One variation of the foregoing method was to spread paste-like materials on strips of glass cloth tape, cure and condition the assemblies and observe their performance under various post-conditioning treatments. Some materials sublimed under conditioning, others embrittled the glass cloth, many flaked upon bending, while some maintained a measure of flexibility. There were, of course, some combinations of these manifestations. These experiments provided valuable indications of the relative merits of the materials under observation.

* * *

Another quite similar technique was adopted for study of fiber and impregnant combinations. Impregnation was accomplished by application of a binding liquid to a pad of the matted fibrous material being studied, and removing excess impregnant by applying pressure to the soaked pad. The saturated pad was then dried or cured, exposed to the environments required, and observed under various conditions. These latter included flexing, immersion in fluids, application of

fluids to one surface in order to observe permeability of the felt by a given fluid, and tearing to estimate the degree of binding of the fibers by the impregnant.

* * *

Future work envisions extension of use of the above sample preparation methods for evaluation of electrical properties under various environmental conditions.

Wire Prototype—User Evaluation

The next step in evolution of an insulated wire construction was the making of prototypes using the more promising materials or combinations of materials. For preliminary evaluation of these, there was established a "Standard Identification Test Procedure" to assure uniform treatment to identify the respective constructions by such parameters as capacitance, corona onset, dielectric properties, effects of high temperature exposure and other pertinent characteristics. This procedure, of course, ruled out some prototypes, and demonstrated unique performance characteristics of others.

* * *

Accomplishment of this step marked the point where user evaluation for specific applications was required to give meaningful guidance to future development effort. Consequently, technical data accumulated during the earlier screening stages of materials and wire prototypes were organized and presented in a descriptive circular, and made available together with samples of wire to field sales personnel for distribution to potential users. Study by these latter and trial evaluations by some have had these interesting and valuable results:

(1) **Acceptance and use of two of our prototypes.**

(2) **Modification of various details of design of one of these wires to fit specific application requirements. This has resulted in development of three standard types of the original product.**

(3) **Request for shielded wire, paired and shielded wire, tubular metallic covered wire and wire with such special features as high temperature terminations.**

New Products

One of the products referred to above is sold under the trademark "Phosroc", and three current types are identified as "Phosroc I, II and III", respectively. The other newly developed wire construction, using glass-mica tapes as the high temperature dielectric, is marketed under the trademark "Mica-temp".

* * *

The following information relative to "The Phosroc Series" reflects the development sequence previously outlined.

Phosroc I (700°-800°F.)	Application Data
Nickel-clad copper conductor Flexible inorganic impregnated inorganic fibrous insulation Sealed Teflon* moisture barrier Teflon* coated glass braid	For open wiring Has initial moisture resistance

The following laboratory test results were obtained on size 20 AWG with approximately .025 inch total covering:

Flexibility—

1500 hours at 750°F.	No cracking upon hand flexing
20 minutes at 1400°F.	No cracking upon hand flexing
1 hour at minus 65°C.	No cracking upon hand flexing

(These results were reported by a customer from his evaluation of samples of wire at room temperature after exposure.)

Dielectric Strength

Dry, as made	1500 + volts
Wet, as made after 4 hours in water	1000 + volts
18 inch loop after 1500 hours in 700°F. followed by 4 hours in water	1000 + volts

(Test voltage was 60 cycle AC. Dry dielectric on straight sample in lead shot. Wet dielectric on 3-inch U-loop. Heat exposure was accomplished in a mechanical convection oven.)

Corona Onset

Sea level, room temperature	900 + volts
150,000 feet, room temperature	300 volts

(Room temperature corona onset was determined on equipment meeting requirements for corona testing to Military Specification MIL-C-17C. The wire sample was tested using water as ground.) (Corona onset at altitude was reported by a customer from his evaluation of a sample of wire.)

Insulation Resistance	Ohms/6 in.
72°F.	Greater than 2×10^{13}
500°F.	Greater than 1×10^{11}
84°F. after 20 min. at 1400°F.	Greater than 8×10^{6}

(These values were reported by a customer from his evaluation of a sample of foil-wrapped wire.)

Flame Resistance	
5 minute exposure to 2000°F. flame	Withstood 125 volts No flame travel

(Tested to Flame Resistance Test of Military Specification MIL-C-25038 (USAF) "—specimen—subjected to an open flame adjusted to impinge directly on the support bracket so that the thermocouple or temperature measuring device shows a temperature of 2000°F. for a period of 5 minutes.—During this 5-minute period, a potential of 125 volts rms shall be impressed between the conductor and outer insulation. The conductor shall not fault to the supporting bracket and the flame travel along the specimen shall not extend beyond the side holes in the test fixture.")

* * *

Phosroc II (700°-800°F.)	Application Data
Nickel-clad copper conductor Flexible inorganic impregnated inorganic fibrous insulation Glass braid High temperature silicone resin lacquer	For sealed or partly sealed wiring (e.g., all or part enclosed in metal tube, or other application in which Teflon* vapors at elevated temperatures may be objectionable) Has some initial moisture resistance

* duPont trademark for polytetrafluoroethylene.

Typical test values on size #20 AWG with approximately .025 inch total covering.

Dielectric Strength

Dry, as made	1000 + volts
Wet, immediate immersion	750 + volts

(Test voltage was 60 cycle AC. Dry dielectric on straight sample in lead shot. Wet dielectric on 3-inch U-loop.)

* * *

Phosroc III (1000°-2000°F. short time) — **Application Data**

Nickel-clad copper conductor
Flexible inorganic fibrous insulation
Special high temperature braid

For enclosed or sealed wiring
No initial moisture resistance

Typical test values on size #16 AWG with approximately .038 inch total covering.

Dielectric Strength

Dry, as made	1300 + volts

(Test voltage was 60 cycle AC. Dry dielectric on straight sample in lead shot.)

During 5 minutes exposure at each of the following temperatures in succession, withstood continuous application of 300 volts AC between the conductor and a stainless steel tube in which the sample was inserted:

1000	degrees F.	1700	degrees F.
1400	" "	1800	" "
1500	" "	1900	" "
1600	" "	2000	" "

(Impressed voltage was maintained during adjustments to successive temperatures.)

* * *

A brief summary of the characteristics of the glass-mica insulated wire marketed as "Micatemp" is as follows:

Micatemp

Nickel-clad copper conductor
Glass reinforced mica tapes
Teflon* filled glass braid (1200°F.) or
untreated inorganic fiber braid (1700°F.)

(Where moisture resistance under heat cycling is required, silicone resin filled glass braid or untreated inorganic fiber braid is used in lieu of the Teflon* filled glass, and wire is inserted into a stainless steel tube.

Typical test values on size #12 AWG with approximately .015 inch total covering.

Dielectric Strength

Dry, as made	200 volts breakdown after holding 100 volts 1 minute
Dry, as made, 3 turns about 1 inch madrel	1800 volts
Dry, after 24 hours at 1200°F.	1500 + volts
Wet, after 8 hours immersion in water	Held 1000 volts 1 minute
Wet, after 24 hours immersion in water	600 volts

(Test voltage was 60 cycle AC. Dry dielectric straight samples in lead shot. Wet dielectric on 3-inch U-loop. Mandrel sample wrapped overall with lead foil and tested conductor to lead foil and mandrel.)

* duPont trademark for polytetrafluoroethylene.

Conclusion—Future Developments

At the present state of the art, many applications require compromises between the more critical features of the requirements and such balance or combination of performance characteristics as can be built into the wire.

* * *

Continuing developmental activities include consideration of new conductor materials, inorganic matrices and impregnations, impervious flexible and rigid outer coverings and compatible terminations. Higher and higher temperatures, lower weights and smaller diameters continue to characterize requirements of users, and so identify for any given interval of time

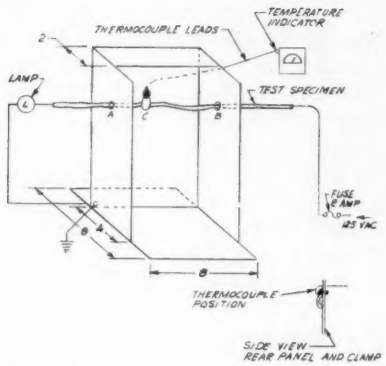

FIGURE 1. FLAME TEST FIXTURE

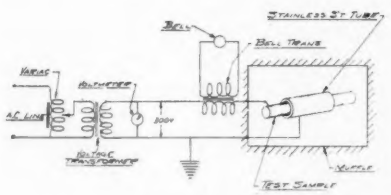

FIGURE 2. PHOSROC III - 1000°-2000°F TEST SET-UP

the dynamic goals of the manufacturer of high temperature wire.

Acknowledgement

Grateful acknowledgment is made of the assistance of Messrs. **J. F. S. Abbott, C. F. Shelton, Jr.** and **H. G. Burt** in the preparation of this paper.

Note: Mr. Parker was with Rockbestos Wire & Cable Co. at the time this paper was presented. Since then he has joined the Engineering Department staff of the Anaconda Wire & Cable Co. at Hastings-on-Hudson, N. Y.

An Invitation to OUR READERS

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About Nails

This article on nails, their uses and supposed uses through the centuries, is a little out of the ordinary for this publication, but it is published in the hope that lighter reading sometimes is welcome, at the same time being informative.

Fig. 1 — Before the Industrial Revolution and the advent of labor-saving machinery, nail making was slow, arduous and expensive. Each nail was pointed, cut from an iron strip and the head formed by hand. This eighteenth-century lass is hammering a point on the end of a heated strip of iron. The pointed end was later chopped off and the head formed on the cut end. The resulting product was scarce and costly. * * * * * * * * * *

Did you know that plain, ordinary nails were once used to cure fever and ward off evil spirits?

* * *

Or that people have been saying "hit the nail on the head" for at least 2,000 years?

* * *

Or, that your own house, if it's a typical frame building, is probably held together by at least 67,000 nails?

* * *

Nails are such a commonplace necessity of everyday life that hardly anybody realizes what a long and fascinating history they have.

* * *

The nail was invented all the way back in the Bronze Age—once men had learned to work metal, it didn't take them long to discover that small bits of it could be pounded into fasteners that were far superior to old-fashioned resin paste and leather thongs.

* * *

Some of the Bronze and Iron Age nails that have been found in Europe are merely pointed slivers, widened at the top, but others have mushroom-like heads and are practically identical to modern ones.

Nail-making was a flourishing industry in England during the Roman occupation in the 1st Century.

* * *

In the Orient, nails made of precious metals with decorative heads were used on religious monuments and on the furniture of the wealthy, hundreds of years before Christ.

* * *

King Solomon's throne, according to tradition, was studded with golden nails.

* * *

And in the Middle Ages, Europe, too, began to use nails for decoration. Nails with heads worked into elaborate star and flower designs, or shaped like animals and human faces, ornamented church and castle doors, locks and ironwork.

* * *

The harnesses and armor of medieval knights were often studded with nails bearing devices from the owner's coat of arms.

* * *

And the metal, leather or embroidered covers that protected precious hand-illuminated manuscripts had decorative nails down the edges to keep them from scuffing and tearing.

Fig. 2 — Most modern development in the long history of nail making is the spiral-shank Ardox nail, manufactured by Jones & Laughlin Steel Corporation, Pittsburgh, Pa. The fluted shank of the Ardox nail gives twice the holding power of the conventional smooth-shank nail, and drives more easily with less danger of splitting the wood. * * * * * * *

Fig. 3 — Most modern development in the long history of nail making is the spiral-shank Ardox nail, distributed in Connecticut by L. L. Ensworth & Son, Inc., Hartford. The fluted shank of the Ardox nail gives twice the holding power of the conventional smooth-shank nail, and drives more easily with less danger of splitting the wood. * * * * * * *

* * *

Decorative nail-making was popular throughout the Renaissance; it began to die as cutting machines replaced hand forging at the end of the 17th Century.

* * *

In America, nail-making machines didn't come into general use until shortly after the middle of the 19th Century. And, since nails were in great demand in Colonial days, many farm families found that pounding them out by hand was a pleasant and profitable occupation during the long winter months.

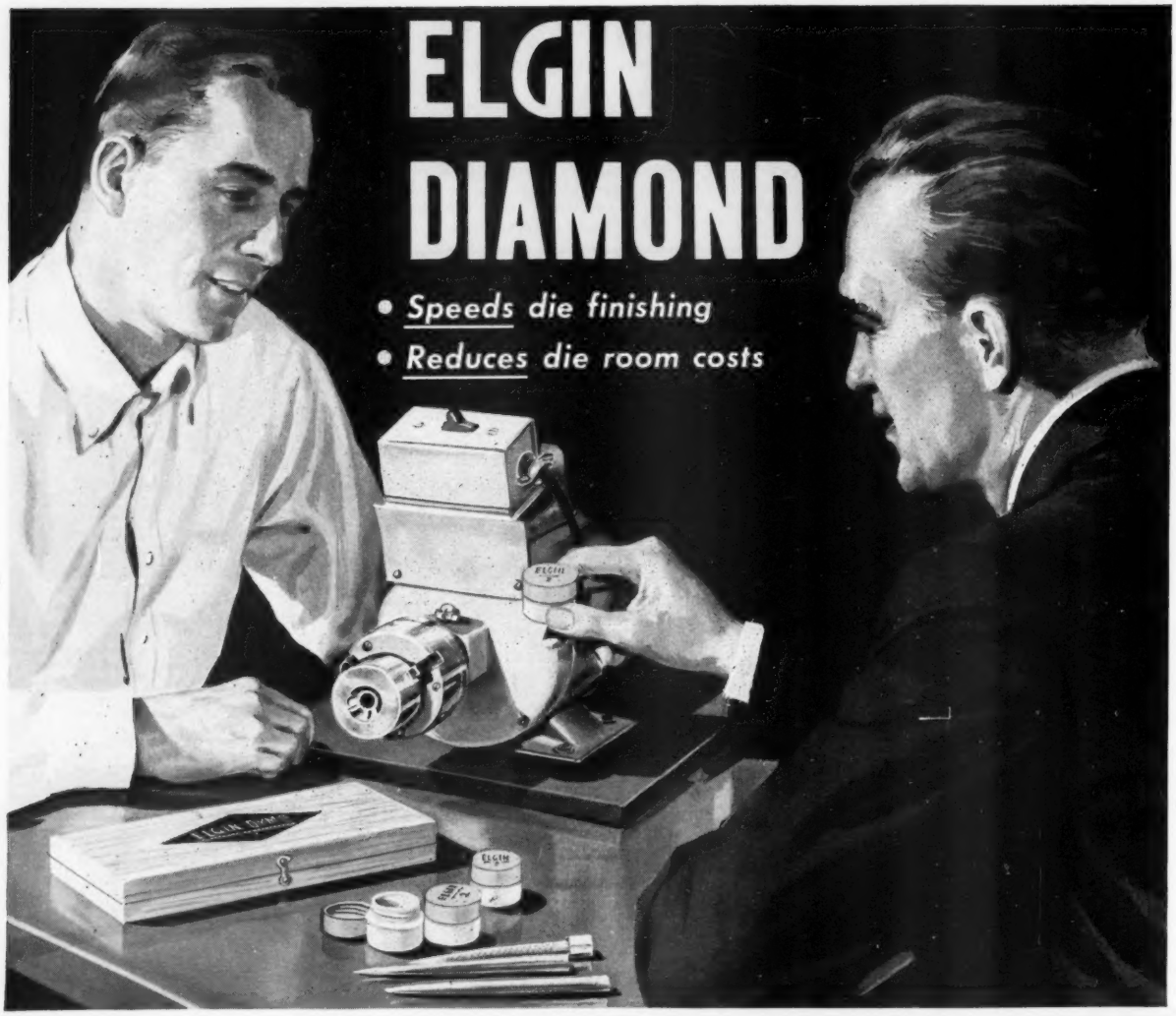
* * *

In the middle of the 19th Century, the development of machine-drawn wire revolutionized nail production. Wire nails could be turned out so quickly and cheaply that they could be sold for little more than the price of the wire itself.

* * *

Over the past 100 years, nail manufacturers have concentrated on perfecting their product and

(*Please turn to page* 519)



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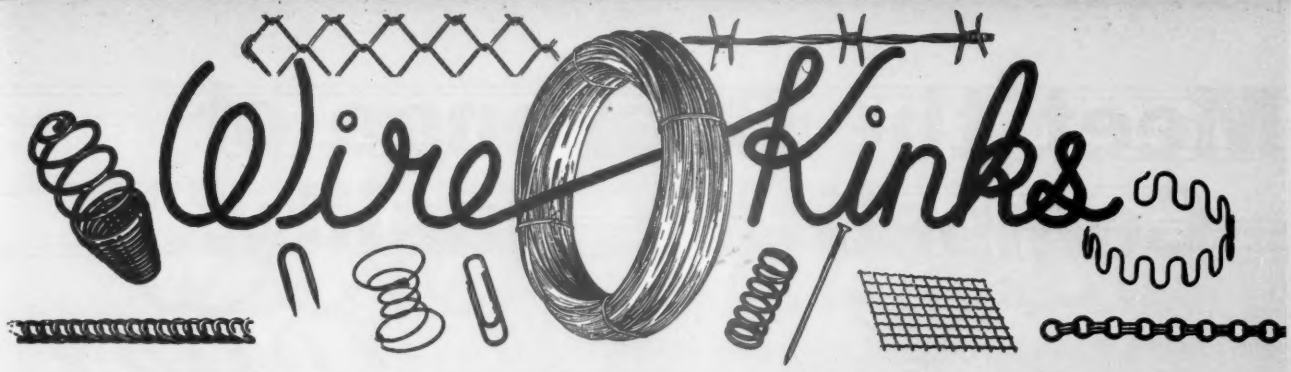

Correction

In an item in this department that appeared on page 219 of our February issue, mention was made of the high speeds of drawing wire at a **Western Electric Company** plant as a war-time measure.

* * *

We are advised that the company now is drawing copper wire as finishing speeds of 10,000 FPM at two of its plants on a daily production schedule, with no excessive maintenance problems or undue die wear. It is the company's evaluation that die wear is directly related to pounds of wire drawn rather than to the speed of drawing.

* * *

WE's latest No. 1 machines break down 5/16″ copper rod to 14 gauge at 6300 to 6500 FPM and .343″ diameter bronze rod to 15 gauge at 6300 FPM. The company's No. 2 machines, originally designed with change gears for 8,000, 10,000 and 12,000 FPM operation, were standardized during the '30's for 10,000 FPM. One of these machines has been in continuous use on two and three shifts for 27 years; four others have been running at this speed for 24 years or more. All are in continuous 3-shift use. That they are compatible with the modern trend toward closer diameter tolerances is attested by the fact that all wire produced for plastic insulated exchange cable is held to within a diameter variation of .0002″ for 24 and 26 gauges, and to .0004″ and .0003″ for 19 and 22 gauges, respectively.

* * *

While the high-speed machines used by the company originally were designed and built by them, machines now are commercially available in this country that are said to operate up to 4000 FPM on rod breakdown machines and up to 7500 FPM on intermediate machines.

Readers are invited to send us how-to-do-it items for this department. For each item received that is published we will pay contributors $10.00. Your cooperation will be appreciated by us and our many readers. May we hear from you?

Galvanizing Flux Technique

QUESTION

We are having trouble with our galvanizing. Can you give us information on modern fluxing practice that will ensure good coatings?

ANSWER

A flux is a material that converts insoluble oxides into soluble salts or liquids, which, when removed from the metal surface, leaves it perfectly clean to enable the two metals to fuse evenly and thus provide a well bonded, homogeneous coating.

* * *

In hot dip galvanizing good fluxing is of primary importance, since zinc has a strong affinity for clean, bare iron. Early methods employed a muriatic acid dip, followed directly by a sal-ammoniac flux on the top of the molten zinc bath. The disadvantage of this process was that the oils and greases removed by the acid remained as impurities in the acid bath.

* * *

Even rinsing after the HCl treatment did not do a sufficiently thorough job. A later flux technique eliminated the muriatic acid dip in favor of pickling, thorough rinsing and drying, and a dip in a solution of zinc-ammonium-chloride. Best results are obtained when this solution is slightly on the acid side, as if the pH is about 7, it will precipitate hydroxides out of the solution, which, if present on the metal surface, tend to insulate the molten zinc from the base metal, resulting in peeling and flaking of the zinc coating.

* * *

This technique overcomes a tendency toward corrosion and greatly reduces the formation of dross and oxide. Besides eliminating the formation of iron oxide, no oxygen is formed to combine with good zinc to produce oxide skimmings.

Stainless Wire for Parachutes

The Space Age has brought about a new use for stainless steel wire. This fine wire application was developed jointly by the Air Force and American Steel and Wire. The wire was drawn by Fort Wayne Metals, Inc. and woven by the W. S. Tyler Co., Cleveland.

* * *

The wire is woven into a mesh with 40,000 openings per square inch to form parachutes for the Air Force space vehicles. It is also used to strain space rockets and other missile fuels. Potential uses may be radar reflectors, antennas, automobile roofs, seat covers and some types of decorative trim.

* * *

It will replace synthetic yarns due to the ability of the metal to withstand the high heats developed on re-entry into the atmosphere.

Header Nut Wire

QUESTION

Could you supply me with information on the kind of wire that is best suited for making nuts in cold heading machines?

ANSWER

Nut wire is a closely controlled

Meet the Challenge of Competitive Quality...

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To The Wire Industry

with the **NEW**
American Made
REVOLVING DIE HOLDER
by *Wire Machinery, Inc.*

FEATURES

- Water seals are not disturbed when changing die sizes. Completely sealed water system.
- Designed for operation with motor readily interchangeable in either vertical or horizontal position.
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SPECIFICATIONS

- Motor totally enclosed, ball bearing, special high temperature winding. 220/440.

ADVANTAGES

- Quality production of consistently round wire.
- Wire is centered on the axis of die creating symmetric deformation in wire drawing.
- Uniform wear on die greatly increases die life.
- Regular feeding of the lubricant avoids scale formation on die — Results:– Less friction – reduces scratching – produces round concentric wire.
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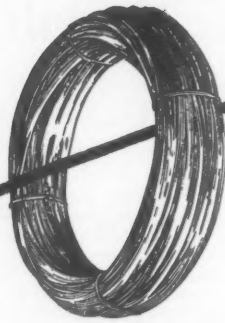
Wire Kinks



wire designed to assure internal soundness and freedom from surface imperfections, thus providing satisfactory cold heading, cold expansion, cold punching and thread tapping performance. The operations are very severe and wire must be specially prepared for the making of nuts. Resulfurized steels are particularly sensitive to cold heading operations. This steel is one to which sulfur has been added to facilitate the forming. The best steel for cold nut forming is rimmed steel.

* * *

This steel is usually used for nut making. It is a low carbon steel in which incomplete deoxidation permits the metal to remain liquid at the top of the ingot, resulting in the formation at the bottom and the side rim of a considerable thickness of metal of high purity and freedom from flaws. In the open hearth furnace in which it is made the charge is six percent molten pig iron and the balance is scrap. Oxidation removes the metalloids present, leaving less than one percent.

* * *

The main concern in producing a steel to be cold headed is to come up with something that will stand up under the very severe forming to which it will be subjected, and in this the sulfur that is added greatly improves the machinability for the thread tapping operation.

* * *

Anything that will increase the iron oxide content of the steel will improve the rimming action, since the rim formed is entirely dependent upon the speed with which the reaction of iron oxide and carbon takes place in the steel as soon as it is poured. Since carbon is a strong reducing agent, the carbon content should be as low as possible and, conversely, the iron oxide content should be as high as possible to form good cold heading steel in the rim zone.

Equipment for Stainless Steel Wire

QUESTION

What are the essentials for a modern stainless steel wire plant?

ANSWER

Assuming that the operations will start with rod, the first essential is a room in which to store the rods. Each rod bundle should be properly tagged as to grade and the rods so stored that any desired grade may be picked up readily by the crane when needed.

* * *

An annealing furnace of the rotary or batch type capable of maintaining a temperature of 2100°F throughout the cycle is necessary. This is followed by a quenching tank equipped with a heat exchanger to keep the cooling fluid from becoming too hot. For ferritic grades a furnace in which the temperatures may be zoned is desirable.

* * *

The cleaning house should have tanks for muriatic, sulfuric and nitric-hydrofluoric acids, a cooling and rinsing water spray, and tanks for copper, lime or other coatings to be used.

* * *

In the drawing room there should be heavy duty drafting machines, intermediate machines and fine wire drawing machines. Drawing spools are relatively low, with finishing speeds at the .020 inch size of 300 to 900 fpm and finishing speeds at the .004 inch size of up to 2000 fpm. Average finishing speeds of 500 fpm are common practice.

* * *

For in-process annealing of the finer gages a strand annealer usually is used, although a batch type furnace can be employed if desired.

* * *

Axilary equipment that may be needed, depending on operations, are tinning equipment, straightening and cutting machines, re-reeling or spooling machines, centerless grinders (where superfine finishes are specified), wire flattening mills, testing equipment, and facilities for inspection, shipping and finishing.

Semi-Killed Steels For Wire Products

QUESTION

We would like to know what advantages there are in the use of semi-killed steel.

ANSWER

A killed steel is defined as one that has been deoxidized by the use of aluminum, ferrosilicon or other deoxidizing agent to the point where there is no evolution of gas during the solidification of the ingot in the mold, causing the top surface to freeze with the consequent formation of an internal pipe.

* * *

Semi-killed steel, on the other hand, is one in which deoxidation has not been carried as far as in the killed steel. Blowholes are thus formed in the ingot.

* * *

The purpose of making semi-killed steel is largely a matter of

(*Please turn to page* 524)

X-Ray Measurement of Intragranular Misorientation in Metals

When a polycrystalline metal is plastically strained, the resulting deformation may be a bending or tilting of the atomic lattice within the grains of the metal known as misorientation. The National Bureau of Standards has recently developed an X-ray diffraction method for obtaining quantitative measurements of this deformation. Such data will be used in studying the mechanical properties of metals.

An X-ray diffraction method was recently developed at the **National Bureau of Standards** to measure intragranular misorientation in metals—a bending or tilting of the atomic lattice within the grains—after plastic strain. The method has thus far been used to derive numerical values for this sensitive structural parameter in cartridge brass specimens. The data indicate that some of the misorientation induced by plastic deformation in tension disappears after compression. Experimental results of this work will be used in Bureau research on metal fatigue and in studying the mechanical properties of metals.[1]

* * *

The grains or crystallites of which an ordinary polycrystalline metal specimen is composed may become misoriented when very small amounts of plastic strain are applied. This misorientation has been qualitatively determined in studies of metal structure; however, only a few quantitative measurements have been obtained, and these required techniques of considerable complexity. To devise a simpler technique of quantitative measurement, **C . J. Newton** and **H. C. Vacher** of the Bureau's mechanical metallurgy laboratory undertook the present investigation.

Fig. 1—Dr. C. J. Newton adjusts the instrument for obtaining X-ray measurements of the misorientation in metals after plastic strain. The X-ray beam is emitted from the copper target tube at the extreme right. A small rectangular metal specimen may be noted in the mount in the center of the apparatus. * *

* * *

A preliminary study showed that misorientation of several hundredths of a degree could be determined by means of a two-exposure photographic process. In this process, two patterns of spots obtained by X-ray diffraction from the grains in a specimen are photographed, one exposure being made while the specimen is oscillating and the film is stationary; the other, while both the film and the specimen are oscillating synchronously. The breadths of a large number of spots thus reproduced on the two films are then measured, and an average breadth for each film is calculated. From these data, a numerical value may be derived for average misorientation in the specimen.

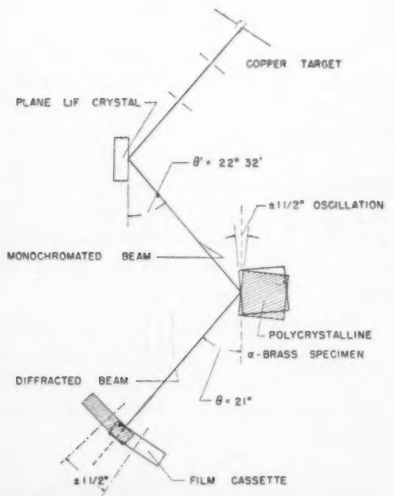


Fig. 2 — Schematic arrangement of the instrument designed at the National Bureau of Standards to obtain measurements of intragranular misorientation in metals. * * * * * *

Table I. Results of Intragranular Misorientation Measurements in Brass

State of Plastic Deformation			Average Misorientation, 1/100 Degree			
			45° Section	Cross Section	Longitudinal Section	Condition Average
Annealed Initial Condition			-	-	-	6
Cycle Position	Net Strain	Cumulative Strain				
Positive Cycle						
1/4 (E)	+ 1%	1%	33	27	23	28
1/2 (E-C)	0	2	13	12	10	12
3/4 (E-C-C)	- 1	3	67	38	29	44
1 (E-C-C-E)	0	4	25	18	11	18
Negative Cycle						
1/4 (C)	- 1%	1%	32	18	28	26
1/2 (C-E)	0	2	18	9	15	14

E = Extended 1 Percent
C = Compressed 1 Percent

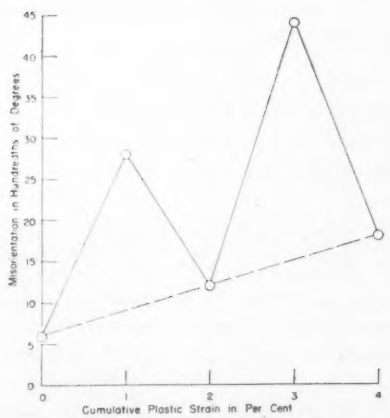


Fig. 3 — Results obtained in NBS experiments on a series of brass specimens are shown in this graph of average misorientation versus cumulative strain for one cycle of plastic strain of one percent amplitude. * * * * *

To obtain such data, an instrument based on the design of a double-crystal spectrometer was constructed. In the first crystal position of the instrument is a stationary mount for a plane crystal monochromator; and in the second crystal position, a specimen mount that oscillates when driven by a small electric motor. A third essential part is a film holder that either remains stationary or oscillates synchronously with the specimen mount. This equipment, together with a collimator, is supported on an adjustable metal base.

(*Please turn to page* 522)

Truck Leasing

by A. J. Schoen, President
Wheels, Inc.
Chicago, Illinois

There are about 290,000 trucks on long-term lease to manufacturers, distributors and retailers. By contrast, there are about 6,800,000 trucks owned by American industry. In the metals industries, the proportions are about 21,000 leased trucks. This includes all sectors of the metals industries, which use about 200,000 trucks in all.

The major reason for the small number of leased trucks is that until recently, truck leasing was not available without expensive maintenance provisions. That is to say, a metals manufacturer could not lease a fleet of trucks without paying for full maintenance care on these trucks—whether the company wanted the full maintenance or not. As a result, truck leasing by the industry has lagged far behind auto fleet leasing, which is available either with or without full maintenance. About 35 per cent of the autos used by the metals industries are leased.

The news that a few major leasing companies will now offer non-maintenance, long-term truck leasing will make a vast difference to many businesses. The following interview with an expert in this field describes the new trends.

What's the Drawback to Truck Ownership?

There is no drawback. Truck ownership is a fine luxury which most wire and wire products manufacturers enjoy — whether they can afford it or not. The fact is, ownership of a truck fleet takes liquid capital out of a business and freezes the cash in fixed assets. Not many companies can afford to do this — but they do.

* * *

As every businessman knows, a company's earnings are determined by the amount of the company's liquid working capital and the number of times within the year this working capital is turned over profitably. A successful business tries to keep its working capital active in current operations — and not tied up in fixed assets.

Normally, How Much Does Working Capital Earn?

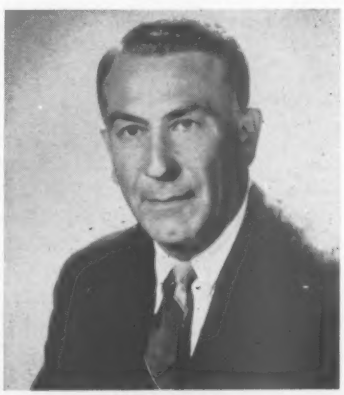
Depending on the industry, profits **on liquid working capital** range from 20 to 90 per cent **before taxes.** That means 10 to 45 per cent after corporate taxes.

* * *

Typically, in the metals industries, manufacturers earn an average of 34 per cent on working capital before taxes. This means that if a wire producer takes a dollar out of working capital and freezes it in fixed assets (for example, a truck fleet), the company is reducing its annual profit by 34¢. If the company uses $100,000 of its working capital to purchase a 25-truck fleet (to use round numbers), the company is giving up before-tax profits of $34,000 in the first year alone—because that is what the working capital could earn if left working in the business.

* * *

It is for that reason that truck fleet ownership is a luxury. Actually, few of the manufacturers who own their fleets can afford the luxury. The obvious solution would be for a company to lease a truck fleet. In this way, the company would have the benefit of conserving its working capital and, at the same time, having a fleet under its own control to do its hauling. Unfortunately, this has not been true in the past. Until recently, no company could lease a fleet **without** full maintenance provisions — which often made leasing costs too high for most companies.



A. J. Schoen

What Kinds of Truck Leasing Plans Are Now Available?

There are two different plans:

A. The Finance Lease—Under this plan a company leases its trucks and nothing more. This is new to the truck leasing field. Under this plan, companies are not obligated to pay for any services other than leasing of the trucks.

B. The Full Maintenance Lease—This is the plan which was typical of leasing trucks up to now. Under this plan the leasing company provides trucks, garages, maintenance, repairs, cleans the trucks—does everything but supply the driver.

Under both types of leases, trucks are engineered for the job by the leasing companies.

What are the Advantages And Disadvantages of the Finance Lease Plan?

The Finance Lease is new to trucking and is offered only by major truck leasing organizations. The Finance Lease is a lease of trucks only, and is not encumbered by maintenance or service charges.

* * *

In the Finance Lease plan, the truck fleet is purchased by the leasing company, delivered to where it will be used, and leased for a term approximating the estimated life of the equipment. For light trucks, 40 months is typical; for heavy trucks, tractors and trailers, longer terms are usual.

* * *

The basic advantage of the Finance Lease is that it offers the lessee the main advantage of leasing — conservation of working capital — while leaving him free to obtain economy in operation and to provide himself with the maintenance and service plan best suited to his fleet.

* * *

Thus, companies which already have facilities for garaging trucks, or parking lots, can obtain the benefit of leasing without wasting

their present facilities. Other companies are able to service their truck fleets with maximum economy by using a local truck agency service — such as Chevrolet agencies for Chevrolet trucks, etc. A company is thus able to conserve its working capital by leasing its trucks, but is not compelled to pay a leasing company for maintenance services which may be obtained at lower costs, or may be unnecessary.

* * *

Where piggyback equipment is concerned, companies can lease their trailers, use the special low rates available to private carriers, and move their products by rail, thus effecting further economies.

* * *

Another advantage of the Finance Lease plan is that leasing charges are based on the fleet discount price of the trucks, and not on the retail list price. Thus the lessee obtains the benefit of the leasing company's ability to purchase vehicles at the lowest possible price. Even with cancellation, the lessee pays only the fleet discount price.

* * *

However, the Finance Lease plan offers **no** advantages for companies in the following situations: where company trucks operate over punishing terrain with utmost wear-and-tear; or where perishable products are moved by truck, and extra trucks must be available for instantaneous emergency; or where **all** truck expenses (including maintenance and repair) must be budgeted in advance. In these three special situations, the Full Maintenance Lease is more advantageous than any other.

* * *

The Finance Lease plan is of special value to companies with the following types of fleet operations:

a. For a company which has truck parking facilities and can save money by using local maintenance and repair organizations.
b. For company service trucks or service industry trucks which normally do not get very rough treatment.
c. For department store delivery units based on warehouse near parking space.
d. For over-the-road trucking operations based on regional plants or warehouses located so that traffic management can avoid deadhead trips longer than one day.
e. For companies whose freight has large bulk but little weight, and thus is expensive to ship by common carrier.
f. For companies whose trucks are engaged in long hauls and hence not available for nightly servicing at a central depot.

(An objective examination of the whole problem of truck leasing, including comparative cost charts, has been published by the Foundation for Management Research. It is entitled, "Truck Fleets: Lease or Buy? An Analysis of Truck Transportation Costs." Single copies are available free to executives who write to the Foundation at 121 West Adams Street, Chicago 3, Illinois.)

What are the Advantages And Disadvantages of the Maintenance Lease Plan?

For companies which need the particular benefits available under maintenance leasing, there is nothing finer. For example, under the Full Maintenance Lease, the leasing company provides the trucks and garages, maintains, services, and repairs vehicles, supplies replacement vehicles in the event of breakdowns, etc. The lease is for the estimated life of the equipment. The company supplies only the drivers and traffic manager to control fleet operations.

* * *

The advantages of this lease plan are:

a. Company capital is conserved for other uses.
b. The headaches of maintenance, replacement, and repairs are transferred to the leasing company.
c. Quick additions or substitutions of trucks to the fleet in emergencies, are part of the lease plan. Normally, the leasing company provides one standby truck for every 10 trucks in service. This tends to justify the extremely high charge for maintenance leasing.

* * *

The Full Maintenance Lease has proven most economical and efficient for companies which have a large number of trucks operating in a **restricted local area** and which need **daily** if not **hourly** maintenance service. Such companies as dairies, breweries, producers or distributors of all sorts of perishables, need immediate maintenance and stand-by service.

* * *

Availability of round-the-clock maintenance service is vital in some industries — but why should a producer of steel, or machine tools, or textiles, or the vast gamut of non-perishable commodities, pay for such emergency maintenance and stand-by service, if the company doesn't need it? Only a small percentage of companies actually need such daily maintenance and emergency stand-by services.

* * *

The Full Maintenance Lease has four major advantages, as we have seen above. However, there are three disadvantages which have limited its growth:

a. The cost per mile, considering all fixed and operational costs, is 15 to 20 per cent higher under a Maintenance Lease than under a non-maintenance (Finance Lease) lease. Since lessees are apt to misuse trucks under a Maintenance Lease, the leasing company must add a large margin for maintenance, repairs and service—whether they are needed or not.
b. The cancellation clause, which, if used, forces the lessee to purchase the trucks, paying the full difference between the original list price of the vehicles and the (straight line) depreciated value.
c. In the instances where drivers must report first to the leasing company's garage for their vehicles and then to their company plant for goods, the cost of portal to portal pay is wasteful and expensive.

When is a Company-Owned Fleet Desirable?

A company-owned fleet is the most common solution to a company's transportation problem — judging from the fact that 62 per cent of all the trucks on the road are company-owned. The remainder are either owned by common carriers, contract carriers, railroads, government, farmers, or are leased. The primary virtue of company ownership of truck fleets is presumed to be lower cost. But what most companies overlook is the cost of capital invested in their truck fleets.

* * *

As we have seen, when a wire producer takes $100,000 out of working capital and freezes it in a 25-truck fleet, this company is sacrificing $34,000 in before-tax profits the first year alone. When

(*Please turn to page* 523)

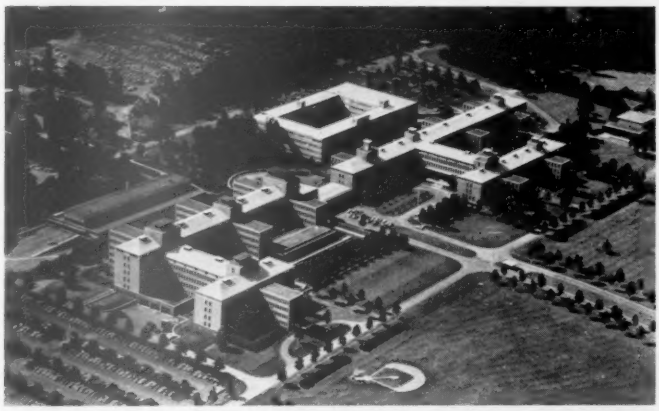
The PLANT VISIT to the BELL TELEPHONE LABORATORIES
DURING the ELECTRIC WIRE & CABLE REGIONAL MEETING

April 27, 1961, Murray Hill, N.J.

Busses will load at the 34th St. entrance to the Sheraton-Atlantic Hotel between 10 and 10:30 A.M., going directly to the Suburban Hotel for luncheon as the guests of the Bell Telephone Laboratories. No private cars may be used.

After lunch the group will be transported to the laboratories, divided into small groups and guided about points of special interest to wire men.

The tour will be concluded at 4 P.M. and busses will be back in New York about 5 P.M.



View of Bell Telephone Laboratories from the air.

A FEW OF THE POINTS OF INTEREST TO BE SHOWN

THE ARNOLD AUDITORIUM — Named after Bell's first Director of Research, this room is designed for perfect acoustical conditions, and is one of the company's acoustical laboratories.

ENVIRONMENTAL PROTECTION LABORATORY — Since outside telephone equipment must withstand the deteriorating effects of atmosphere, ground and ocean-bottom forces, this laboratory studies chemical and biological actions on organic and inorganic materials. The corrosion of metals must be controlled, if long, economical life in outside equipment is to be achieved, the work done here contributing to these factors.

POLYMER PROCESSING LABORATORY — Here scientists study commercial rubber and plastics to be used as wire jackets and elsewhere. Various types of mixers and mills are in operation preparing compounds. An extrusion machine is used to evaluate the materials. This laboratory, on a pilot plant basis, simulates conditions in many electric wire plants.

THE ANECHOIC CHAMBER — This is the "dead" or "free-space" room, having acoustical conditions existing several miles above the earth. In this room, unlike the Auditorium, sound is caused to decay upon entering acoustical cavities in the walls and ceiling. 99.8% of all sound decays upon entering the cavities. The room is used for basic research studies in acoustics and for testing telephone apparatus.

TRANSISTOR MODELS LABORATORIES — In order to supply various departments with special transistors for experimental work, limited quantities are produced. Germanium and silicon crystals are cut and lapped under ideal conditions for experimental work on amplifiers for future submarine cables. They must be designed to give 20 to 40 years of service.

METALLURGICAL RESEARCH DEPARTMENT — All phases of metals research are conducted here to determine physical and electrical properties. Other activities embrace the study of magnetic and semiconductor materials, enamels, solder and metals processing and testing.

This plant visit is unusual in that it offers wire men an opportunity to see many operations out of which will develop some of the products that will become commonplace in the future. All persons attending the Regional Meeting are invited — and urged — to avail themselves of the chance to visit these mammoth R & D laboratories. Your Program Committee feels that it has been fortunate in being able to offer this exceptional plant tour for the Electric Wire & Cable Section's meeting.

Full program details will be found on page 434

THE WIRE ASSOCIATION

RICHARD E. BROWN, Executive Secretary

453 MAIN STREET **STAMFORD, CONN.**

New Motor Stows Horsepower In Small Package

The Reliance Electric and Engineering Company, 24701 Euclid Ave., Cleveland 14, Ohio, has put a round peg in a square hole to reduce the overall size of large A-c. motors.

* * *

This new motor, called the Duty Master D-5000, has a round stator inside its nearly square frame. This unusual arrangement provides better cooling, permitting using a smaller overall dimension for any given horsepower rating.

* * *

The D-5000, which is available from 125 through 300 hp., has large air intakes which cover each end of the motor. Air is drawn in these louvered openings, ducted through the rotor and stator, and then exhausted at the sides. The result is more efficient cooling and more horsepower. The louvers can be removed for inspection and maintenance. Made for 220, 440 or 550 line voltages.

New Electric Wire Stripper and Cutter

Quick-change devices that greatly reduce set-up times are featured in the new Model 810A Automatic Wire Stripper. New features, designed to simplify set-up changes and eliminate the need for hand tools, include a dial indicator on the measuring device, a slide lock to hold feed rolls in place on keyed shafts, quick-release clamps to hold strip assemblies in place, a switch-operated air valve, knurled discs on micrometer nuts and guide bushings to eliminate wrenches, and an air-operated wire straightener that automatically opens and closes to positive stops, obviating the need for adjustment each time wire is threaded through the machine. The machine is air-powered and electrically controlled. It cuts and strips 32 to 12 AWG wire in lengths from 1 inch to 300 feet at speeds up to 8,000 pieces per hour. It may be used to strip Teflon, fiber glass, asbestos, and Kel-F as well as PVC, rubber and other soft insulations. While designed principally for single conductor wire, it will also strip coaxial cable and certain sizes of rip cord. Write **Eubanks Engineering Co.,** 260 North Allen Ave. Pasadena, Calif. for further details.

1960 Supplement to the Metal Cleaning Bibliographical Abstracts—STP 90-E

This supplement covers the period 1958 through early 1960. There are 114 references for this period as well as 100 newly added references for the period prior to 1958.

* * *

New metals present new cleaning problems which must be solved by advanced technics or combinations of older methods. Ultrasonic cleaning, in-place cleaning of equipment in plants, or of pipe lines, and the cleaning of electronic components are receiving much consideration for the special problems involved. The reader will find not only references of practical

ENGRAVED MARKING WHEELS and PRINTING MACHINERY

for BETTER printing on

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application, but also on theory and laboratory evaluation.

* * *

Copies of this book may be obtained from ASTM Headquarters, 1916 Race St., Philadelphia 3, Pa. at $2.00 each.

Mobile A-C Dielectric Strength Test Sets

A new series of mobile high-voltage a-c testers of insulation dielectric strength for laboratory, quality control and production applications is announced by Associated Research, Inc.

* * *

These A-C Mobile Hypot Test Sets meet requirements for development work on insulating materials, electrical components, and completed assemblies, including: motors, generators, transformers, switchgear and cables. Unusual safety provisions as well as quick set-up make them equally suitable for testing in production areas or at field locations.

* * *

A selection of several models with outputs up to 20 kv at 10 kva and to 30 kv at 5 kva is offered. Larger ratings are available in console models.

* * *

Many optional features are available such as: burn test circuit with an accessory transformer providing up to 30 amperes continuously, at 5 to 10 volts, for locating a short circuit.

* * *

Complete information on the new line of A-C Mobile Hypots may be secured from Associated Research, Inc., 3777 West Belmont Ave., Chicago 18, Ill.

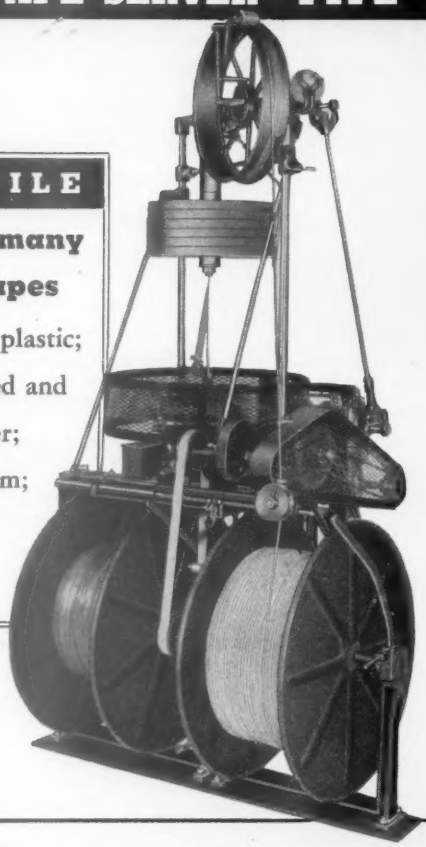
Samples of Stitching Wire

A new book of stitching wire samples has been prepared by **Prentiss Wire Mills, Riverside-Alloy Division,** H. K. Porter Company, Inc., that contains two-inch samples of 25 different types of stitching wire.

* * *

Prentiss, a leading producer of stitching wire for 103 years, included a number of items in the new sample book that were not

NEW WARDWELLIAN
TAPE SERVER - TYPE "B"



VERSATILE
for serving many kinds of tapes
Teflon; vinyl; plastic; cambric; treated and untreated paper; glass; aluminum; brass and copper.

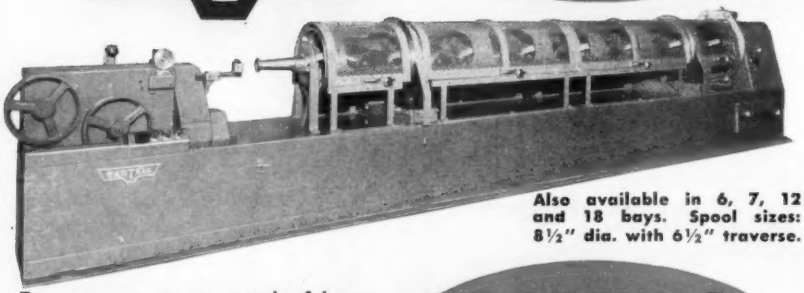
- Equipped with adjustable traverse, supply and windup stands, windup driving mechanism, and electric stop-motion. Capstan-release mechanism permits retracting conductor and replacing it for restarting operation after replenishing supply.
- Machine will apply tapes from ½" wide up to 1" wide on electrical conductors.
- "Reeves" variable speed unit provides for quick adjustment when change of lay is required.
- Production dependent upon width of material and angle of lay.
- Serving head speed dependent upon kind of material. Maximum speed 700 RPM.
- Driving pulley 8" diameter; 1¾" belt. Speed of pulley 330 RPM.
- Ratio serving head speed to pulley speed 2.12 to 1.
- Capstan 18" diameter, 3" face.
- Opening through serving head ⅝" diameter.
- Maximum diameter of flexible conductor ⅜".
- Supply packages 16" diameter, 1" maximum width, ½" minimum width. Size of hole in package 3".
- Supply tube holds eight reserve packages of 1" wide material.
- Maximum power requirement ¾ H.P.
- V-belt motor drive furnished upon request at additional cost.
- Reset counter for measuring product in feet furnished.
- Stands furnished to accommodate reels 30" or 36" in diameter with overall widths up to 16". Wider stands can be furnished upon request at additional cost.
- Special windup drive required for reels with drums under 12" diameter.
- Clamp lock holds windup reel arbor securely in lifter bearing.
- Machine mounted on base plate to assure proper alignment of frame and windup stand.
- Reels not furnished with machine.

Write for complete information

WARDWELL
BRAIDING MACHINE CO.
1212 HIGH STREET
CENTRAL FALLS
RHODE ISLAND, U. S. A.
Representatives for Europe, British Colonies and Dependencies
JAMES MACKIE & SONS, LTD., BELFAST, IRELAND

BARTELL

FOR THE BEST



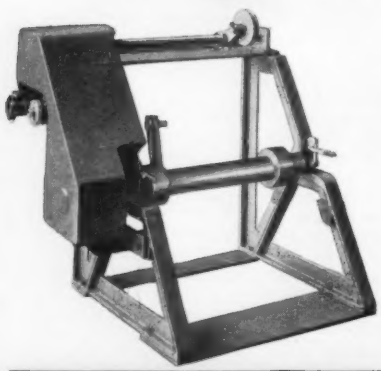
Also available in 6, 7, 12 and 18 bays. Spool sizes: 8½" dia. with 6½" traverse.

BARTELL
SEVEN BAY HIGH SPEED STRANDER
MODEL 7B-58-15

Frames are constructed of hot rolled shapes and plates to form a rigid box structure. Barrel is extruded 6062T-6 aluminum — Smooth starts through slip clutch driven by 7½ H.P. motor — Operators control station at front of machine — Main power control center at drive end — Electronically controlled automatic stop energizes solenoid operated brakes in event of wire breakage — Spool cradles and associated parts are completely interchangeable from one machine to another — Tungsten carbide wire guides throughout — Lay from ¼ in. to 5 in. long.

• CATERPILLAR CAPSTANS • SINGLE AND MULTIPLE HEAD RE-SPOOLERS • TAKE-UP & PAY-OFF STANDS FOR PLATING EQUIPMENT • WIRE STRANDERS

BARTELL TAKE-UP



This Take-Up is belt-driven, the drive originating from a slip clutch located outside the capstan box. Electrically operated traverse adjustable from zero to maximum reel width. Accommodates reels up to 30" dia. Speed selector sheave adjusts lay on reel to suit diameter of finished strand.

WE ALSO DESIGN AND BUILD SPECIAL EQUIPMENT TO MEET SPECIFIED REQUIREMENTS

BARTELL MACHINE-TOOL CORP.
YACHT CLUB ROAD ROME, N. Y.
• DESIGNERS • MANUFACTURERS • ENGINEERS • CONSULTANTS

contained in previous editions. Round tinned bookbinders' wire and flat tinned bookbinders' wire, as well as coppered steel, K bronze and tinned K bronze flat box stay wire make up the current samples.

* * *

Copies of the new Prentiss stitching wire sample book are available at any Riverside-Alloy district office.

Reprint on Imports

The Electronic Industries Association, 1721 De Sales St., N. W., Washington 6, D.C., has made reprints of an article entitled "Imports", by **Robert C. Sprague,** Chairman of the Board of the **Sprague Electric Company.**

* * *

In this Mr. Sprague points out that imports from low-wage countries is one of the problems faced by the electronic industry, giving statistics and effects on industry members and our economy.

* * *

Copies, while they last, may be secured from the E.I.A. upon request.

New Integrated Copper Plant in Philippines

A new plant, first of its kind in the world, is to be built in the Philippine Islands that, without melting, will convert low-grade ores into high-grade copper that can be made into strip, tubing and wire.

* * *

The project, which will cost $23 million, will produce the copper by a chemical leaching and gaseous reduction process. It will be located on Iligan Bay on Mindinao Island, and will operate under the name of **Marinduque Iron Mines Agents, Inc.** The firm now produces large quantities of copper concentrates.

* * *

Pure copper powder is produced by the new process, and this is sintered to form products suitable for rolling and drawing. The process is said to be less costly than conventional methods and can handle low-grade ores economically.

Infra-Red Muffle Ovens

Infra-Red Systems, Inc., Route 23, Riverdale, N. J., has developed a series of Modular Infra-Red Muffle Ovens that have met with unusual response from the electric wire and cable field.

* * *

These ovens are used for curing insulation on wire and cable, vinyl fusing, silicone rubber curing, Teflon sintering and a number of other applications in the wire industry.

* * *

Engineering Data Sheet No. 116 provides details and will be sent by Infra-Red Systems, Inc., upon request.

Fly-Back in Screen Production Eliminated

The problem of "fly-back", the occasional uneven spacing of wires in insect screening, has been virtually eliminated as a result of production methods evolved by **Dodge Wire Corporation,** Covington, Ga., a leading producer of aluminum cloth.

* * *

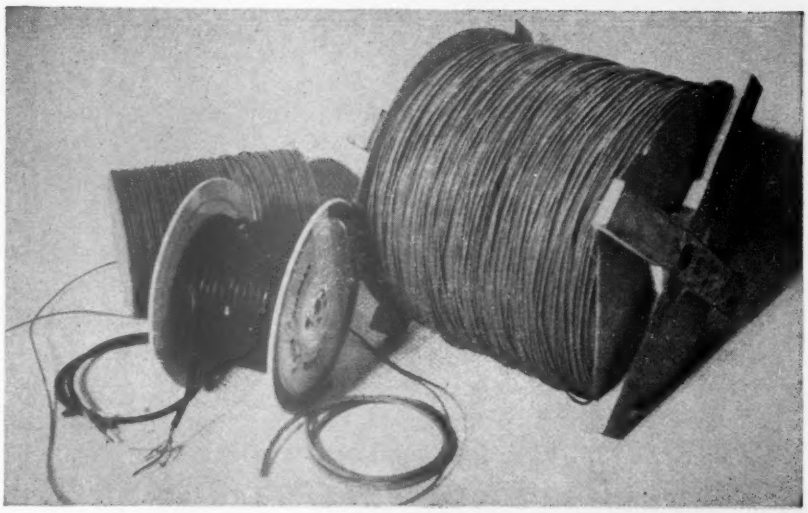
Wilmer B. Thompson, president of Dodge Wire, reports that the solution of this problem by his company is making it possible to manufacture a product of hitherto unattainable uniformity and excellence. Increased demand for the product is being met by a significant step-up in production.

* * *

Dodge Wire's screening is produced on new high-speed looms that are approximately five times more efficient than previously-used equipment. Only in the case of aluminum cloth exceeding 50 inches in width is standard type of equipment still employed by the company.

Reynolds Buys Roebling's Electric Wire Business

Reynolds Metals Company has become a major producer of electric wire and cable through the purchase of the electric conductor manufacturing equipment of **John A. Roebling's Son's Division** of The Colorado Fuel & Iron Corp. Reynolds will move the equipment to



For High Tensile Strength, Specify

TEXTILENE GLASCOR*

Soft, dry fillers for portable and flexible cords, Textilene Glascor and Twi-Port have wide acceptance. Fiberglas-centered Glascor is exceptionally strong without added bulk or sacrifice of pliability. It goes into S, SJ, and SV cords with 18, 16, and 14 gauge conductors — Twi-Port into S and SJ cords with 12 gauge and larger conductors. Successful applications include control, appliance, and power cables; telephone drop wire; communications and coaxial cables.

Twitchell's superior Textilene line also includes: Fungus-resistant filler — *Twi-Tar.* Used for buried communications cable, expanded ACSR cable, and in other applications.

Moisture-resistant fillers—*Twi-Flex* and *Twi-Wax.* Used for nonmetallic sheathed cable, maritime shipboard cable, varnished cambric cable.

*Patent No. 2832190

For Every Wire and Cable Application

Twitchell's TEXTILENE Fillers Fill The Bill

Quality-controlled materials that are dependably uniform . . . in standard forms, or customized to special needs.

Initial low cost with savings added by production efficiency . . . flexible, ready-to-use fillers that fit all equipment, handle and form easily, always maintain desired shape.

Assured supply from a reliable domestic source . . . always available in economical and convenient packaging.

Proved performance as components of cables and wires that meet government specifications . . . stability shown by trouble-free installations in continuous service 20 years and longer.

FREE — SAMPLE SPOOLS of any type of Textilene filler to demonstrate the superiority of Twitchell materials in your operation—also technical counsel without cost or obligation. Just tell Twitchell your end-use requirements. *Write, wire, or phone today:*

E.W. TWITCHELL INC.

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PAPER PRODUCTS FOR THE WIRE INDUSTRY

Twisted • Folded • Pressed • Crushed • Shaped • Braided • Woven

Preliminary Announcement Of The West Coast Regional Meeting of THE WIRE ASSOCIATION

June 22-23, 1961, Jack Tar Hotel, San Francisco, Cal.

PROGRAM SCHEDULE

Thursday, June 22

10:00 A.M.—Registration

2:00-5:00 P.M.—Technical Session. Six papers will be presented, each on a timely subject.

Friday, June 23

9:30 A.M.—Plant Inspection Trip. Busses leave the hotel for a visit to the South San Francisco Mill of Bethlehem Steel Corp. Particular emphasis will be placed on the Bolt Department.

Luncheon will be served at the International Inn.

The return trip will be made via the Scenic Coast route for the enjoyment of the group.

6:30-7:30 P.M.—Hospitality Hour. This will be sponsored by Bethlehem Steel Corp., The Colorado Fuel & Iron Corp., Columbia-Geneva Steel Div. of U. S. Steel Corp., Planett Mfg. Co., John A. Roebling's Sons Div. of C.F.&I., and Wire Specialties Co.

7:30 P.M.—Dinner. Door prizes will be distributed and a top-notch after-dinner speaker will address the gathering. Ladies are invited.

This meeting gives every promise of upholding the traditional hospitality and interest of our West Coast Regional Meetings.

All wire men are cordially invited to be present for the full schedule of events. Make your plans now to be in San Francisco on the 22nd and 23rd of June.

Full program details next month

THE WIRE ASSOCIATION

Richard E. Brown, Executive Secretary

453 Main St. **Stamford, Conn.**

a plant site that has not been announced. Many of the personnel released by Roebling have been invited to join the Reynolds organiation.

* * *

This move by Reynolds somewhat parallels the acquisition of **Rome Cable Corporation** by ALCOA in 1959 and the purchase of U.S. Rubber's electric wire plant at Bristol, R. I., by **Kaiser Aluminum & Chemical Corporation** a year or so earlier.

New Continuous Wet Wire Drawing Machine Announced

"SAMP," Via Galliera 12, Bologna, Italy, has announced the availability of the Universal Model MM-1/T multi-draft wet wire drawing machine for copper, brass and other non-ferrous wires.

* * *

Special features include 7 passes, 4 of which have completely submerged pull-cones that can be tilted for easy threading; gear box for speed changes; two terminal die holders, of which one is a rotating type and the other fixed for shaped wire; electro-pump lubricant circulation; special arrangements on pull cones for threading; two finishing blocks—one horizontal, the other vertical; motor driven capstan and articulated reel to facilitate stripping the vertical block; full safety features; and machine made in 6 parts for shipping. These parts readily and easily assembled at the mill.

* * *

The machine is so designed that auxiliary equipment can be installed, such as: straightener in front of the vertical finishing block; small rolling mill between the last die and the finishing block for producing flat or shaped wire; and an oscillating ring on the vertical block to facilitate the upward movement of the wire.

* * *

Full details on the machine may be secured from Emilio Wartenweiler at the address above.

New Marking Machine for Teflon Wire and Tubing

A major improvement in wire

and tubing marking has been announced by **George E. Kingsley**, Executive Vice President of **Kingsley Machine Co.**

* * *

A featured improvement in the Kingsley air-operated KW-7 wire marking machine is the new dial-type indicating pyrometer in full vision which is furnished with an iron-constantan thermocouple attached to the heated type head. This indicates the marking temperature over a large easy-to-read dial which is calibrated in both Fahrenheit (to 500°F) and in Centigrade (to 260°C) and permits improved operator control and also allows unobtrusive inspection by supervisory personnel.

* * *

For further information and literature, write to the Kingsley Machine Company, 850 Cahuenga Blvd., Hollywood 38, Calif.

New Ribbon Cable

Westwood Cable Corporation, 3440 Overland Ave., Los Angeles 34, has announced the introduction of a new line of multi-colored ribbon cable, according to **H. C. Harris**, President.

* * *

Over three years have been spent by the corporation in product development of Westrip, the copyrighted name of the product. Research and pilot stages were completed last fall, and production type equipment is now operating in the Los Angeles plant.

* * *

By a unique process, multi-colored plastic insulated wires are bonded together to form a flat "ribbon like" cable. Descriptive literature covering the new product is available upon request.

* * *

Westrip is manufactured to military and commercial specifications, in Sizes No. 28 through No. 10, up to one inch wide and up to twenty conductors, at the present.

Spectra-Strip Flat Multi-Conductor

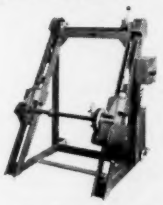
Spectra-Strip Wire & Cable Corporation has introduced a new

THE PROPER SUPPORT, CONTROL and SUPPLY OF WIRE...

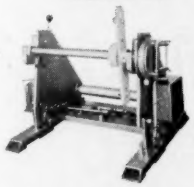
IS ESSENTIAL TO EVERY WIRE PROCESSING LINE!

During nearly half a century of ENTWISTLE Experience in the evolution of wire processing machinery, and in close cooperation with the wire and cable industry, a multitude of pay-off machines have been custom-built to specific performance and applicational criteria. From selected types of shaftless, shaft-type and stationary-reel pay-off machines, ENTWISTLE has developed standard designs with suitable options of power lifts, brakes, drives and control systems to satisfactorily perform in practically any pay-off application.

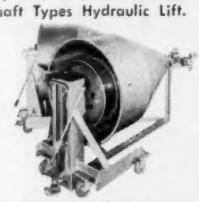
To be sure of proper support, control and supply of wire in your next pay-off requirement, ask about the ENTWISTLE Pay-off for your specifications.



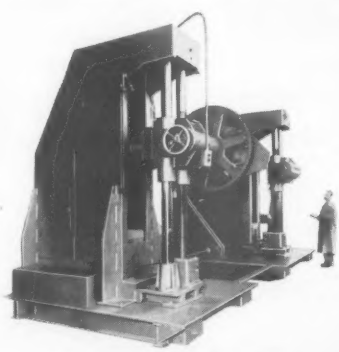
36", 48", 60", 72" and 84" Shaft Types Pneumatic Lift.



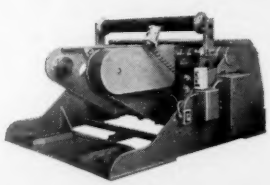
42", 48", 60", 72" and 84" Shaft Types Hydraulic Lift.



22", 30" and 36" Continuous Dual Pay-Off



20 TON X 120" SHAFTLESS MOTORIZED LIFT.



36", 48", 60" and 72" Shaftless Hydraulic Lift.

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ENTWISTLE Manufacturing Corporation

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Made to close tolerances!

Apco Mossberg Reels, Spools and Bobbins are designed and manufactured to precise specifications to assure a true arbor for smooth spool-out at high speeds.

An all steel construction that won't gouge or burr reduces machine down time and maintenance to a minimum.

Apco Mossberg Reels, Spools and Bobbins are designed to give you the exact balance and trueness you need.

For more information, write, wire or call collect.

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Toronto, Ontario, Canada

APCO MOSSBERG COMPANY
LAMB STREET, ATTLEBORO, MASSACHUSETTS

multi-conductor, multi-colored flat ribbon cable. Many advantages are claimed for this type of cable, among them being light weight, flexibility, ease of handling, full visibility of color code, control of inter-conductor capacitance, and uniformity between one length of cable and the next. The space factor is improved at the same time, and better heat dissipation is obtained.

* * *

The insulation is P.V.C. plastic. Gauges run from #10 AWG to #30 AWG, and practically any numbers of conductors. Shielded, Coax, and Thermocouples can be included.

* * *

Details will be sent by Spectra-Strip Wire & Cable Corp., P.O. Box 415, Garden Grove, Calif.

Hillwood Making Drive Screw Nails

Hillwood Mfg. Co., 21700 St. Clair Ave., Cleveland 17, Ohio, has announced the addition to its line of nails a variety of Hely x Drive Screw Nails.

* * *

These nails, made of heat-treated, tempered steel, have unusual holding power and strength. They are offered in screw gages from #1 to #9, in lengths from ½ to 4 inches.

* * *

Drive screw nails avoid the splitting of hardwood boards even when driven within ¼ inch of the edge. They are suited for pallets, tote boxes, bins, joists, flooring, general construction and many other places where holding power is important.

Two Bulletins on Silicone Insulated Wire & Cable

Silicone rubber is one of the most versatile wire and cable insulating materials available. A 4-page illustrated bulletin can be had for the asking which describes and provides data on the various kinds of silicone-insulated cable manufactured by the **Boston Insulated Wire and Cable Company.**

* * *

Entitled "Single and Multi-Conductor Cable with Silicone Rubber", the new bulletin features

power and lighting cable, hook-up wire, ignition cable, as well as an impressive list of conductor cable for shipboard, missiles and nuclear power purposes, just to name a few. The cables described are made with General Electric silicone rubber compounds and represent the latest in silicone technology.

* * *

A second bulletin, "Wire and Cable Application Case Histories", outlines case histories involving silicone rubber cable applications. Discussed in the 4-page bulletin are case histories involving radiation resistant cables and miniaturized switchboard wires, using silicone rubber insulation.

* * *

Write to the Boston Insulated Wire and Cable Company, 63 Bay St., Boston 25, Mass.

Pennsalt Moves Technical Service to New Laboratory

Pennsalt Chemicals Corporation has announced the transfer of its Sales Technical Service groups to new and expanded laboratory facilities at 900 First Avenue, King of Prussia, Pa. They previously were located at Pennsalt's Whitemarsh Research Laboratories, Wyndmoor, Pa. and at Devon, Pa.

* * *

The new building, a two-story, 31,000 square foot customer service laboratory, is the first unit to be completed in the Company's planned $6,000,000 Technical Center. This Center will be located on a 50-acre site in King of Prussia Industrial Park.

Bulletin on Conveyor Muffle Furnace

A new bulletin, issued by **Sunbeam Equipment Corp.**, Meadville, Pa., describes the features of the new Sunbeam Conveyor Muffle Furnace for continuous bright copper brazing, bright annealing and bright hardening of stainless steel parts. It is especially suited to high volume operations where low dew point atmosphere must be maintained.

* * *

For a copy, write the company requesting Bulletin SEC-13.

EFFICIENT, MODERN SYSTEMS
FOR
ELECTRICAL WIRE & CABLE MANUFACTURING

• *CABLE LACQUERING SYSTEMS*

Conventional cellulosic, or other type, lacquers are applied in successive continuous coats from one to twenty-eight coats over fibrous braid wrapped primary conductors. One end, four ends, or eight ends of wire are handled continuously. System includes letoff, application, drying and constant tension takeup equipment.

• *WIRE ENAMELING SYSTEMS*

Natural and synthetic enamels, silicones, solution nylon, modified plastisol, and similar insulating coatings are applied to bare, cotton or glass covered wire in round, square or rectangular cross section. Ten or twenty simultaneous strands are handled. Systems are complete with letoff, preannealer, application system, capstan and multiple takeup unit.

• *ASBESTOS INSULATING SYSTEMS*

Carded asbestos is applied to continuous single conductor as an integrated operation with saturating, rotary forming, drying, cooling and polishing of the finished wire. Wire from No. 20 gauge to No. 6 AWG is handled through an asbestos wall thickness range of from .008″ to .040″ thickness in a single pass.

• *RUBBER OR PLASTIC JACKETING SYSTEMS*

Rubber and thermoplastic jacketing compounds are continuously applied to electrical wire or cable by the extrusion method. High speed, constant tension letoff and takeup equipment, controlled cooling or continuous vulcanizing equipment are powered by synchronized range drives as complete, integrated wire handling systems. Extrusion machines of customer's choice are furnished.

• *GLASS & VARNISH COATING SYSTEMS*

Double layer of glass or cotton wrapping is applied to round, flat or square conductor. Two individual coatings of high temperature varnish are applied and the finish baked in a continuous operation. Units are complete from letoffs to takeup frames.

• *SELF TRAVERSING REEL CORD DRYERS*

These ingenious machines are used to remove hygroscopic moisture from fibers, braided or knitted flexible cable. These machines increase extrusion speeds, reduce blister scrap loss and improve diameter control. They are easily installed in existing extrusion line.

TECHNICAL INFORMATION ON ANY OF THESE PROCESSES
UPON REQUEST

C. A. LITZLER CO., INC.
235-239 BROOKPARK ROAD
CLEVELAND 9, OHIO

Outstanding Personalities of the Wire Industry

Coulter & McKenzie Elects Lewis Vice President

The Coulter & McKenzie Machine Company has announced the election of **Thomas E. Lewis, Jr.,** to the position of Vice President. He graduated from New Haven College with an honor degree in Mechanical Engineering.

* * *

Prior to joining Coulter & McKenzie, Mr. Lewis served a formal apprenticeship as a machinist in the Central Machine Shop of The American Brass Company in Ansonia, Conn., and during the Second World War, he served in the European Theater as a Company Commander in the United States Army, Ordnance Battalion of the Fourth Armored Division.

* * *

He is a member of The American Welding Society, The Wire Association, Bridgeport Manufacturers Association, Connecticut Manufacturers Association, Bridgeport Chamber of Commerce, a former President and Executive Committee Member of the Fairfield County Section of The American Society of Mechanical Engineers, and a member of the faculty of Bridgeport Engineering Institute, where he instructs an Engineering Course in Manufacturing Methods.

* * *

Mr. Lewis started with Coulter & McKenzie as Design Engineer eleven years ago, and was successively machine designer, Assistant Chief Engineer, Chief Engineer, Superintendent and Works Manager. He also is a Director of the Company.

Thomas E. Lewis, Jr.

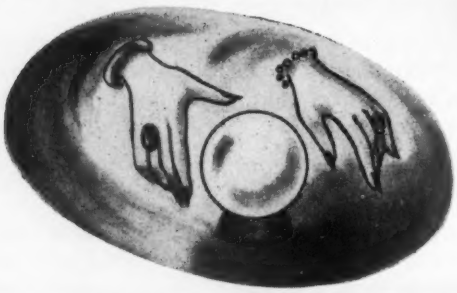
* * *

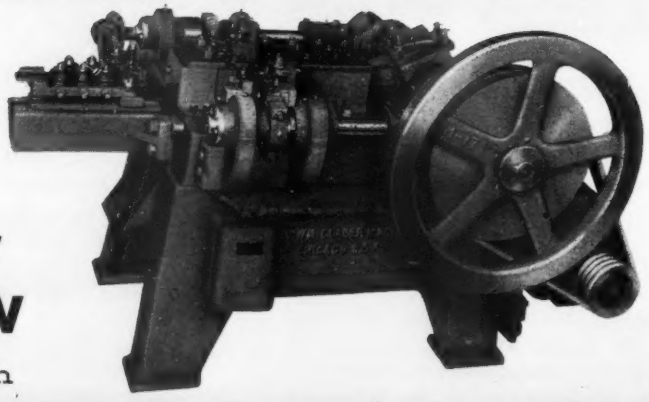
Mr. Lewis holds several United States and Foreign patents relative to the processing of hot and cold metals which include methods and mechanical devices which The Coulter & McKenzie Machine Company builds and licenses to the wire trade and spring trade, here and abroad. He is currently on a business trip to visit Licensees and users in England, Belgium and France.

Job Changes at Western Electric

Beecher H. Clark, central installation manager of **Western Electric Company,** the manufacturing and supply unit of the **Bell Telephone System,** has been elected a vice president to head the

IF THERE'S A NAIL MACHINE IN YOUR Future make it a GLADER





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Wm. GLADER MACHINE WORKS 210 N. RACINE AVENUE CHICAGO 7, ILLINOIS

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company's installation organization effective March 1.

* * *

In his new position, Mr. Clark will direct a nation-wide force of about 14,000 employees who install central office equipment which the company manufactures for the Bell System.

* * *

In other executive changes, the company announced that **John J. O'Brien,** a manufacturing division vice president headquartered at Indianapolis, will become vice president, finance, on April 1.

* * *

Mr. O'Brien will transfer to the finance division on March 1 as vice president, administration, reporting to **Charles D. Dugan,** who is vice president, finance, and a director of the company. The latter will retire on March 31 under the company's age rule.

* * *

William E. Burke, who is now vice president, installation, will succeed Mr. O'Brien in the manufacturing division post.

Keystone Names Sales Executive

Appointment of **Donald A. Sommer** as General Sales Manager of the **Keystone Steel & Wire Company,** Peoria, Illinois, has been announced. He assumed direction of the company's sales organization in February.

* * *

In announcing the promotion, **R. E. Sommer,** President and General Manager, pointed out that Keystone's two sales divisions—Industrial, and Merchant Trade —have been functioning independently since 1951. The growing competitive nature of the steel business, however, and greater diversification of Keystone product lines, has made it desirable to recreate the position of General Sales Manager.

Donald A. Sommer

* * *

D. A. Sommer, a great-grandson of **Peter Sommer,** who founded the company in 1889, joined Keystone in 1950. After completing a plant training program, and working in the Wire Mills, he joined the Industrial Sales Division as a trainee. Since 1954 he has served as Assistant Manager of the department. He attended the University of Illinois and graduated from Bradley University in 1950.

Rockbestos Names Macgillivray as Works Manager

Alfred H. Macgillivray has been appointed works manager of the **Rockbestos Wire & Cable Co.,** Div. of Cerro Corp., according to an announcement by the Company's President, **A. S. Basil.**

* * *

WIRE MARKING INKS

- WILL PASS ALL PRESENT DAY ABRASION AND SOLVENT RESISTANT TESTS
- SPECIFICALLY COMPOUNDED FOR DIFFERENT INSULATIONS

  POLY VINYL CHLORIDE
  RUBBER, NATURAL OR SYNTHETIC
  NYLON
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- FOR PRINTING OR SPIRAL STRIPING
- DATED FOR SHELF LIFE AND INVENTORY CONTROL
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IN THE MARKING OF EXTRUDED MATERIAL THERE ARE BIG ADVANTAGES IN ONE SINGLE SOURCE OF SUPPLY.

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West Coast Representative: Paul I. Kenner Co., 220 Shaw Rd., So. San Francisco, Calif.
West Germany: Walter G. Fritzke GMBH, AM Wehrhahn 94-96, Dusseldorf, W. Germany
Warbrick Engineering Specialties Limited, Barclays Bank Chambers, Sanky Street, Warrington, England.

Alfred H. Macgillivray

Previously production manager at the Rockbestos main plant here, Mr. Macgillivray's promotion puts him in charge of plant engineering, production, personnel and purchasing. Before joining Rockbestos in 1959, he was superintendent of the Collyer Insulated Wire Co., Pawtucket, R. I.

* * *

A 1939 graduate of Brown University, Providence, R. I., Mr. Macgillivray holds a Bachelor of Science Degree in Engineering.

Leonard Appointed Vice President by FWM

Ardelle Glaze, president of **Fort Wayne Metals, Inc.,** has announced that **Frank Leonard** has been elected to the Board of Directors and to the position of Vice President for Research and Development. He also will continue to serve as supervisor of executive sales for the state of Michigan.

* * *

A partner and one of the firm's founders, Mr. Leonard has a rich background of 36 years experience in industrial wire production. He began his career in the fabrication department of the National Standard Company at Niles, Mich., in 1925, and had been Wire Mill Superintendent for 11 years when he left in 1946 to help found Fort Wayne Metals, Inc.

* * *

Prior to assuming the vice presidency he had been Associate Director for Research and Director of Personnel. He is a recognized authority on industrial applications and the weaving, braiding, stranding and drawing of stainless steel wires. For nearly a quarter of a century he and President Glaze have conducted joint research projects relating to the magnetic properties of stainless steel wire and other wire products.

Frank Leonard

* * *

Mr. Glaze further said that Leonard's vast experience in plant

Our manufacturing program comprises wire drawing machines, bolt and nut making machines, multi-stage cold headers for series parts, etc

MALMEDIE

Fully automatic multi-stage cold bolt header QPB 13

MALMEDIE & CO · MASCHINENFABRIK GMBH · DÜSSELDORF

REPRESENTATIVES FOR U.S.A.

Straus-Artys Corp.

45 NO. STATION PLAZA - GREAT NECK, N. Y.

TEL: HUNTER 2-4514 — CABLE: ARTYSKOM GREATNECK (NY)

layout and operational planning will be used in connection with the company's impending move to their new 30,000 square foot building adjacent to the present Waynedale plant. Partial operations will get underway during the first quarter of 1961.

* * *

Fort Wayne Metals' range of wire products enjoys a wide usage throughout the textile and paper manufacturing industries and they continue to show increased use in space age applications such as parabrakes that are employed for re-entry of nose cones, flexible tubing for pressure shielding of missile fuel lines and aircraft cable for ambient and high temperature functions.

Sidney Rolle in Europe

On March 17 Sidney Rolle, Consulting Metallurgical Engineer, Princeton, N. J., a veteran member of **The Wire Association** and a former Director, sailed for Europe and will be returning to the United States on June 20th.

Mr. Rolle, accompanied by Mrs. Rolle, will motor through France, Spain, Italy, Yugoslavia, Austria, Germany and England, combining business and pleasure in following his extensive itinerary.

General Cable Appoints Asst. Vice Pres.

The appointment of **S. E. Yeaton**

S. E. Yeaton

as Assistant Vice President of **General Cable Corporation** has been announced by **J. R. MacDonald,** President and Chairman of the Board of the Corporation.

* * *

Mr. Yeaton is well known in the wire and cable industry having directed sales of electrical wire and cable for **John A. Roebling's Sons Corporation** for a number of years.

Appointed Corporate Controller At Hudson Wire

Management of **Hudson Wire Company** takes pleasure in announcing the appointment of **Bryan J. MacDonald** as Controller of the Corporation.

* * *

In his new position, Mr. MacDonald will be directly responsible for the accounting activities in the Company Divisions located at Ossining, New York; Winsted and Norwalk, Connecticut; and Cassopolis, Michigan.

* * *

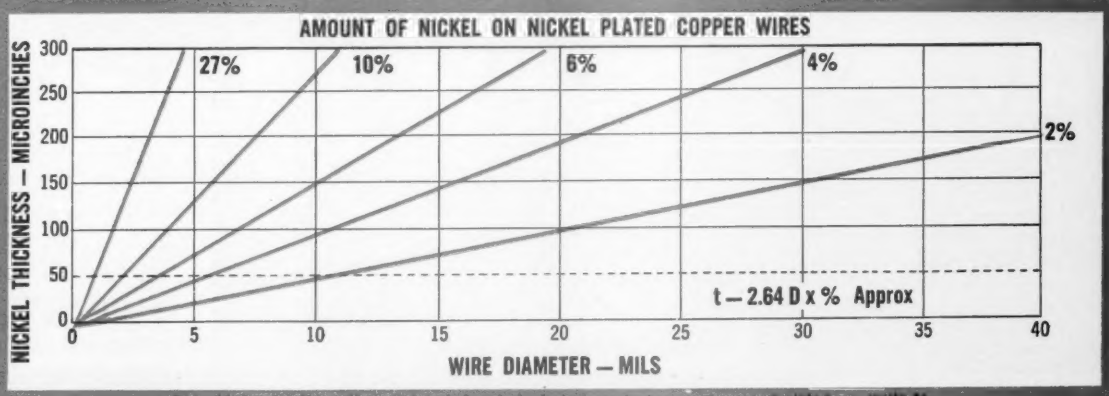
The Ossining Division specializes

Your First Source For NICKEL PLATED COPPER WIRE

TO: ASTM-B-355-60T • MIL-W-16878D • MIL-W-27300

As a principal supplier of nickel-plated copper for the high temperature wire industry, HUDSON produces conductors to all military and industrial specs. Many constructions — with the "standard" platings shown on the chart below — are available from stock. Others can be produced on short notice.

With our modern plating facilities, HUDSON is continually setting industry standards for the highest quality wires at the most competitive prices. Contact us today for our published price list. And let us quote on your special constructions.



For additional information on stranded and single-end conductors — bare and plated — write to:

HUDSON WIRE COMPANY

OSSINING DIVISION, OSSINING, NEW YORK / TELEPHONE: WILSON 1-8500

in bare, plated and stranded specialty wires for the insulated wire and cable manufacturing industry, and for mechanical applications. The Winsted and Cassopolis Divisions produce a wide variety of magnet wires for electrical and electronic applications. The Pequot Division in Norwalk, Connecticut, manufactures industrial wire cloth in rolls and fabricated parts.

* * *

Since early in 1960, Mr. MacDonald had been Divisional Controller for the Ossining Division. He joined Hudson Wire in 1949 as a cost accountant, and later was appointed Chief Accountant. He attended Pace College of Accounting, University of Washington (Seattle), U.C.L.A., and San Diego State College.

Elgin Abrasives Division Names Sales Engineer

The Abrasives Division of the **Elgin National Watch Company** has announced the appointment of **John W. Middeker, Jr.,** East Haven, Conn., as a Field Engineer for the Diamond Products of this Division.

* * *

Mr. Middeker, who will be responsible for both direct and distributor sales and service, will cover Connecticut, in addition to Sullivan, Orange, Putnam, Dutchess, Ulster, Westchester and Rockland Counties of New York.

Changes in Dow Sales Offices

Three management changes in sales offices of **The Dow Chemical Company** have been announced by Donald K. Ballman, vice president and director of sales.

* * *

Glenn H. O'Neal, sales manager of the St. Louis office for many years, has been promoted to sales manager of the Chicago office. He succeeds **Henry S. Pierson,** who recently resigned.

* * *

Robert J. Minbiole, sales manager of the New Orleans office for the past five years, has been promoted to sales manager of the St. Louis office, succeeding Mr. O'Neal.

* * *

Frank H. Sellars, district sales manager for chemicals in the New York office, has been promoted to sales manager at New Orleans.

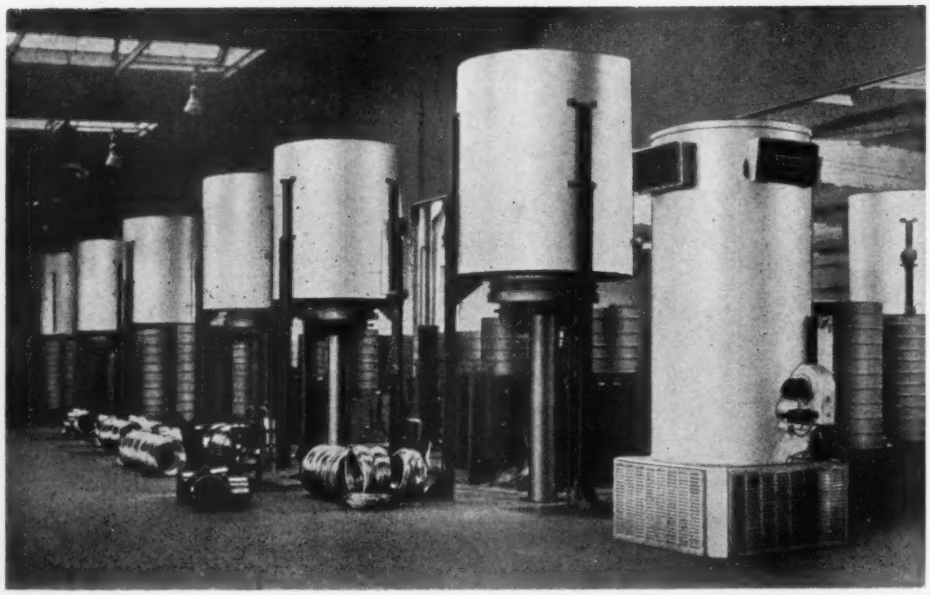
To Sell Bakelite Plastics in Midwest

William R. Neely has been appointed a Technical Representative in the Mid-Western Sales Region of **Union Carbide Plastics Company** Division of **Union Carbide Corporation,** by H. L. Burpo, Regional Manager. He will be responsible for the sale of Bakelite Brand polyethylene, vinyl, styrene, and phenolic resins and compounds for molding, extrusion and flexible packaging applications, operating from the Company's District Sales Office at 910 Baltimore Ave., Kansas City 41, Mo.

* * *

Mr. Burpo also announced the appointment of **Fredric M. Smith,** who will work in a similar capacity, with headquarters at 230 North

THE LAST WORD IN MODERN EFFICIENT DESIGN!



SEVERAL VACUUM BRIGHT ANNEALING UNITS WHICH WE HAVE INSTALLED IN ONE OF THE MOST PROMINENT CABLE WORKS IN GERMANY

(German and Foreign Patents)

*

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OFENBAU **FRITZ** G. m. b. H. & Co. K. G. **HAGEN,** (W.-GERMANY)

Michigan Ave., Chicago, Ill.

* * *

Mr. Neely, a graduate of Dartmouth with a degree of B.S. in Economics, joined the company in 1959. Mr. Smith graduated from the University of Massachusetts with a degree of B.S. in Zoology and from the Columbia University Graduate School with a Master of Business Administration degree. He too joined the Union Carbide Plastics staff in 1959.

Union Carbide Plastics Appoints Mid-Western Sales Manager

Howard L. Burpo, Jr., has been appointed Regional Manager in the Mid-Western Sales Region of **Union Carbide Plastics Company,** Division of Union Carbide Corporation. According to the announcement by **J. B. Knowles,** Manager-Sales, Mr. Burpo will direct the sale of Bakelite Brand polyethylene, styrene, vinyl, phenolic, and epoxy resins and compounds.

* * *

P. W. Wood, who has been Mid-Western Regional Manager since November, 1958, will serve as Product Manager — Polyethylene, located in the New York City General Sales Office.

* * *

Mr. Burpo will be assisted by **Harold A. Holz** and **William G. Westergan,** Assistant Regional Managers, and will be located in the Company's Office at 230 North Michigan Avenue, Chicago 1, Illinois (FInancial 6-3300).

AS&W Appoints Asst. Sales Manager

The appointment of **Noman M. Sted** as assistant general manager of sales of **American Steel and Wire Division** was announced by **B. P. Doty, Jr.,** general manager of sales for this U.S. Steel Division.

* * *

Mr. Sted, who has held several key sales executive posts with AS&W, received his education at Cleveland College of Western Reserve University. In addition, he attended the Advanced Management Program of Harvard University in 1955. He joined the company in 1926.

Elgin Abrasives Division Appoints Sales Engineer

The Abrasives Division of the **Elgin National Watch Company** has announced the appointment of **William R. Sundermann,** Philadelphia, Pa., as a Direct Field Engineer for the Diamond Products of this Division.

* * *

Mr. Sundermann, who will be responsible for both direct and distributor sales and service, will cover Southeastern Pennsylvania, Maryland, Delaware, and the District of Columbia.

Houtz Moved to Cleveland From Waterford by G.E.

J. William Houtz has been named sales representative for the East Central District of General Electric's **Silicone Products Department,** Waterford, N. Y. His office

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"American" AIM INSULATING MACHINERY COMPANY
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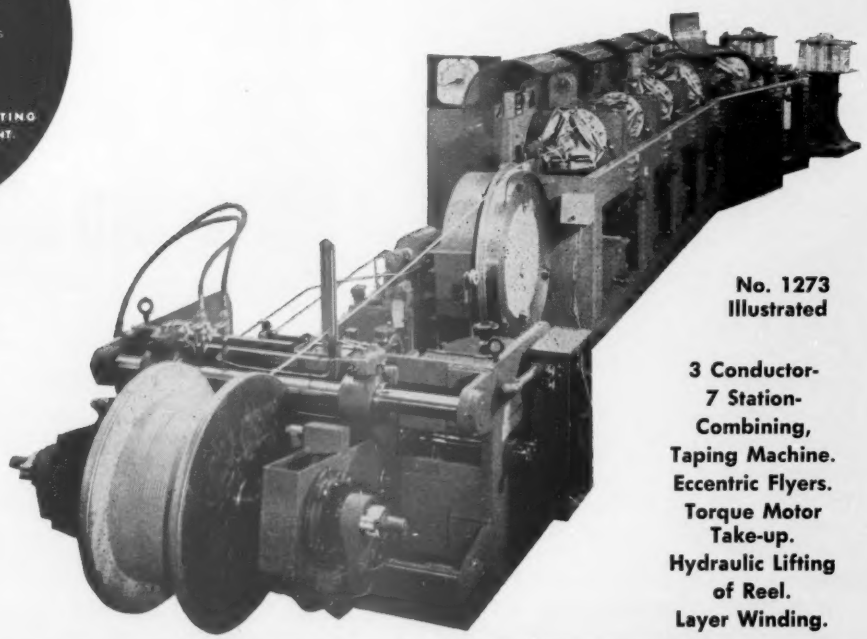
PHILADELPHIA 33 PENNSYLVANIA U.S.A.
MANUFACTURERS OF WIRE INSULATING MACHINERY AND ALLIED EQUIPMENT. MACHINERY MFG. TO CUSTOMERS SPECIFICATIONS.

High-Speed Taping Machines
High-Speed Insulated Wire Winding Machines
High-Speed Resistance Wire Winding Machines



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No. 1273 Illustrated

3 Conductor-7 Station-Combining, Taping Machine. Eccentric Flyers. Torque Motor Take-up. Hydraulic Lifting of Reel. Layer Winding.

location is 1503 Brookpark Road, Cleveland, Ohio.

* * *

Mr. Houtz was graduated from Pennsylvania State University in 1954 with a B.S. in chemistry. He joined General Electric last year as a salesman in the Silicone Products Department. Prior to joining G-E, he served as a chemist with Wolf's Head Oil Refinery Inc., a position which he held since 1958. He was also associated with Pillsbury Mills from 1957 to 1958 as a chemist.

Bulletin on Custom Insulating

Sprague Electric Company has issued a new bulletin entitled "Custom Insulating", in which they describe their insulating services on special fine wire conductors for high temperature applications that will be used for 200°C to 500°C and higher temperatures.

* * *

These involve various coatings suited to the conditions of use on clad copper, precious metals, nickel, alloys and many other metals such as aluminum, tungsten, tantalum, molybdenum, etc.

* * *

For a copy of the bulletin, write Sprague Electric Co., North Adams, Mass.

Made Assistant Sales Manager By Driver-Harris

Appointment of **Edwin Shuttleworth III,** assistant vice president, as assistant sales manager has been announced by Driver-Harris Company of Harrison, N. J., manufacturer of electrical alloys.

* * *

Mr. Shuttleworth joined the company in 1950, and became the technical assistant to the president three years later. In 1957 he was made director of Driver-Harris's Italian manufacturing facility. He was named assistant to the vice president in 1958, and became the director of the Driver-Harris Co., Ltd., in England one year later. Mr. Shuttleworth attended Lehigh University, where he received a B.S. degree in Industrial Engineering in 1950.

H-VW-M Appoints Sickles

Hanson - Van Winkle - Munning Company has announced the appointment of **Ralph E. Sickles** as Field Electrochemist, headquartered at the H-VW-M Cleveland office.

* * *

Prior to joining H-VW-M, Mr. Sickles had for 5 years been an engineer and electrochemist in the process and development section of a large rubber company. From 1952 to 1955 he was chief chemist for a far Western steel fabricator and for 5 years prior to 1951 he was an analytical chemist with one of the nation's largest steel companies. A Kent University graduate, he also attended Mississippi College. During World War II he served with the Army Air Force.

Phayre Appointed By Driver-Harris

Appointment of **Charles E. Phayre** as assistant sales manager has been announced by **Driver-Harris Company.**

* * *

Here is the difference between just any reel and MPS reels with
DURA CURL RIMS
Yes, it's the exclusive MPS heavy duty thickened-section rims that assure maximum strength and rigidity throughout the reel heads. Flange run-out and straightening expenses are eliminated by this patented MPS development. DURA-CURL rims are now standard on all MPS wire drawing, annealing, and stranding spools and reels. We invite your inquiries – let us tell you more about Dura-Curl rims.
MPS
trouble-free winding spools and reels
Mossberg PRESSED STEEL Corporation
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TEL CAstle 2-0847
DIVISION OF WANSKUCK CO.
No. 107

Mr. Phayre joined Driver-Harris in 1959 as Marketing Manager, having previously worked in various sales and management capacities in the metal industry. He is a graduate of Dickinson College, received his M.B.A. from Wharton School in 1949, and attended Temple University where he studied metallurgy.

Chase Heads AIEE in '61-'62

The nomination of **Warren H. Chase** to be 1961-62 president of the **American Institute of Electrical Engineers** was announced in January at the opening of the five-day Winter General Meeting of AIEE in New York. The election will be by mail ballot among the Institute's more than 55,000 members and results will be announced at the Summer General Meeting at Ithaca, N. Y. in June.

* * *

Mr. Chase is vice president of the Ohio Bell Telephone Company, with which he was first associated in 1919. His service with the company has been continuous since 1925. Mr. Chase received a bachelor of science degree from Harvard University School of Engineering. Previously he had attended Case Institute of Technology at Cleveland. He is a vice president of AIEE (1958-61) and has been active on several committees.

To Sell Silicones on West Coast

Charles A. Berridge has been named sales representative of the **Silicone Products Department** of **General Electric,** Waterford, N. Y. His office location will be 8555 East Florence Street, Downey, Calif.

* * *

Mr. Berridge is a graduate of the University of Wisconsin and holds a B.S. Degree in Chemistry. He joined General Electric on the Chemet Training Program in 1953 and was assigned to the Silicone Products Department as a development chemist the following year. In 1958 he moved to the rubber market development section, a position which he held until his present assignment.

Appoints Manager for New Product Development

The appointment of **John R. Jones** as Manager, New Product Development is announced by **Alfred Sonntag,** President, **The Alpha-Molykote Corporation,** Stamford, Conn. In this position Mr. Jones will be responsible for the development of new lubricants to meet increasingly demanding requirements of modern technology for more effective boundary lubrication.

* * *

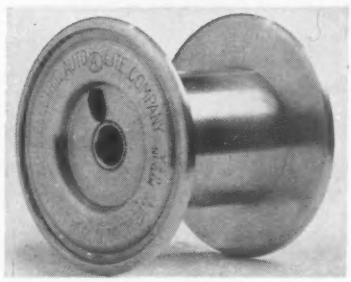
Mr. Jones joins Alpha-Molykote from the Boeing Airplane Company where he has been Materials Engineer in charge of Fuels, Lubricants and Hydaulic Fluids in the Transport Division. His 13 years experience in the lubrication field also includes employment with Douglas Aircraft Co. and the Esso Standard Oil Co. He holds many patents in the lubricant and lube oil additive fields.

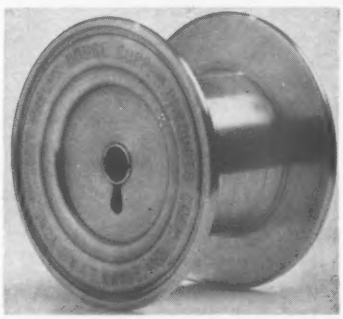
* * *

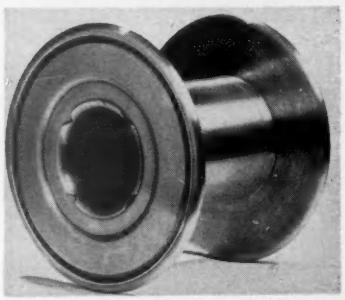
Mr. Jones holds a B.S. in chemistry from Trinity College, Hart-

DESIGNED FOR CUSTOMER APPEAL:

HUBBARD ALUMINUM SPOOLS







NEW FEATURES

1. STRONGER ALUMINUM HEAD — NO WEIGHT INCREASE
2. WELDED CONSTRUCTION — NO OPENING AT HEAD AND BARREL
3. SMOOTH SURFACES — NO SNAGS, REDUCES WIRE SCRAP LOSS
4. UNIFORM TARE WEIGHT — IDEAL FOR BULK WEIGHING

HUBBARD SPOOL DIVISION

Van Norman Industries Inc.

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ford, Conn., and served in the Infantry and Chemical Warfare Service during World War II.

Pacific Smelting Appoints Sales Manager

M. D. Schwartz, president of **Pacific Smelting Company**, has announced the appointment of **Theodore K. Stark Jr.** as Sales Manager of the Company. In this capacity, Mr. Stark will be in charge of sales of all Pasco zinc products which includes Pasco Slab Zinc, Pasco Zinc Oxide, Pasco Zinc Dust, Pasco Zince Anodes and zinc alloys.

* * *

Mr. Stark was formerly employed with one of the world's largest trading companies and had responsibilities involving buying and selling foreign and domestic industrial products. He joined the Pacific Smelting staff as a salesman in December, 1955.

* * *

Pacific Smelting Company produces all types of zinc products used for galvanizing wire for the major wire producers in the West.

Awards Committee Enlarged

Dartrey Lewis, Chief Engineer, Research and Development, **John A. Roebling's Sons Division** of The Colorado Fuel & Iron Corporation, Chairman of The Wire Association's Awards Committee, has announced the enlargement of the Committee to 16 members. These are divided so that eight will be responsible for judging Ferrous Division papers for awards and eight who will consider Non-Ferrous Division papers. The Non-Ferrous Division embraces the Electric Wire and Cable Section.

* * *

The members of the Awards Committee now are:

Ferrous Division

J. W. Campbell
Ass't. to the President
Wickwire Brothers, Inc.
Cortland, New York

Karl F. Hellinger
General Superintendent
Rochester Ropes, Inc.
Culpeper, Va.

Rudolf H. Hertzog
Ch. Engr., Wire & C. R. Products Sales Division
John A. Roebling's Sons Div.
The Colorado Fuel & Iron Corp.
Trenton, N. J.

Norman T. Nelson
Assistant Superintendent
Rod and Wire Mill Division
Bethlehem Steel Company
Sparrows Point, Md.

John R. North
Wire Mill Superintendent
Laclede Steel Company
Alton, Illinois

A. M. Reeder
Metallurgical Engineer
Jones & Laughlin Steel Corp.
Pittsburgh, Pa.

Gordon T. Spare
Research Project Engineer
American Steel & Wire Div.
United States Steel Corp.
Newburg Works
Cleveland, Ohio

John S. White
Works Metallurgist
Baltimore Works
Armco Steel Corporation
Baltimore, Md.

Non-Ferrous Division

Harold W. Adams, Director
Electrical Conductor Products
Reynolds Metals Company
Richmond, Virginia

Grover W. Brown, Manager
Machinery Development
The Okonite Company
Passaic, New Jersey

COPPER - Refined metals consumed in mill products 1/ in 1959, in 1960, by months, preliminary totals for 1960, and stocks of refined copper at end of period, gross weight in short tons

	Consumption						Stocks of refined copper	
	Wire mills	Brass mills						
	Refined copper 2/	Refined copper 2/	Refined lead	Primary pig tin	Refined nickel	Slab zinc	Wire mills	Brass mills
1959	836,177	584,100	2,715	1,021	3,522	114,860	17,159	32,687
1960:								
January	68,095	39,383	199	84	374	8,591	16,060	27,401
February	72,812	43,806	194	74	441	8,362	13,781	28,183
March	87,955	44,882	215	89	328	8,841	13,610	32,432
April	70,590	39,022	129	65	224	6,167	23,630	38,813
May	69,466	41,167	153	57	242	6,280	31,112	36,705
June	72,541	43,166	167	62	226	7,159	35,899	34,161
July	39,753	28,934	84	43	89	3,961	52,222	32,824
August	71,306	44,213	175	61	221	7,592	47,840	31,020
September	73,852	44,991	205	64	234	7,196	46,236	30,285
October	67,507	42,396	162	74	309	8,090	44,693	30,461
November	64,792	40,746	150	63	229	6,003	43,053	31,112
December	68,450	34,283	142	68		6,706	35,149	32,088
Total	827,119	486,989	1,975	804		84,948	------	------

1/ Data cover operations of 18 wire mills and 61 brass mills.
2/ Detailed information on consumption of refined copper is published in the Monthly Copper Report.

Ardelle Glaze, President
Fort Wayne Metals, Inc.
Fort Wayne, Indiana

Bruce W. Gosner
Technical Director
Battelle Memorial Institute
Columbus, Ohio

James S. Higgins
Plant Engr., Copper Div.
Walker Brothers
Conshohocken, Pa.

R. S. Higginbottom
Chief Cable Engineer
Triangle Conduit & Cable Co.
New Brunswick, New Jersey

Clement C. Lawson
Plant Facilities Engineer
Bell Telephone Laboratories, Inc.
Murray Hill, New Jersey

Marshall V. Yokelson
Chief Metallurgist
General Cable Corporation
Bayonne, New Jersey

This committee will judge the eligible 1960 papers and present their recommendations to the Board of Directors.

* * *

At the Spring Meeting of the Board, the Directors select members of the Association to whom will be awarded The Wire Association Medal Awards in recognition of the most meritorious contributions made to the advancement of the wire industry in the form of papers presented at any meeting of the Association, or any articles published in WIRE AND WIRE PRODUCTS during the preceding year that were written by members and contributed without compensation. One paper in each division of the Association, Ferrous and Non-Ferrous, will receive this award. The Board also may award annually a Certificate of Honorable Mention under similar conditions for one each of an outstanding paper or article covering respectively ferrous and non-ferrous or electric wire and cable subjects.

* * *

In addition to the Medal and Honorable Mention Awards, the Board of Directors has authorized the presentation to the recipients of the awards of cash payments of $100.00 and $50.00 respectively to each award winner.

G.E. Silicone Appointments

Three major appointments to **General Electric Silicone Products Department** posts were announced by **Jerome T. Coe,** Department General Manager.

* * *

John H. Blomshield has been named manager, facilities design and construction; **Donald C. Kuhre** has been appointed manager, general accounting; and **Thomas H. Fitzgerald** has been promoted to manager of the East Central District of the Department's national sales operation.

Made V.P. and G.M. Of Seymour Mfg.

Carl H. Wadell has been elected vice president and general manager of **Seymour Mfg. Co.** of Seymour, Conn. Mr. Wadell had been works manager from 1945 to 1956. Since 1956 he has been general superintendent of the firm's Housatonic plant.

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WIRE AND WIRE PRODUCTS
It pays — send for rates
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STAINLESS WEAVING *Wire*

. . . for industrial wire cloth, conveyor belts, detention screens, and special purposes. Dry drawing and strand annealing in process as well as at finish produce maximum uniformity. Most grades and tempers, with quick shipment from on-hand stocks.

MARYLAND FINE STAINLESS WIRE

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Hose Reinforcing
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When you need any of these wires you need Maryland Fine quality and service.

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MARYLAND FINE & SPECIALTY *Wire* CO., INC.

MAIN OFFICE AND PLANT • COCKEYSVILLE, MARYLAND

A Review of Recent Wire Patents

The data listed below is only a brief review of recent patents pertinent to the readers and subscribers of this publication.

Complete copies of these patents may be obtained by writing to the publisher of this magazine and remitting 50¢ for each copy desired. For orders received from outside the United States the cost will be $1.00 per copy.

No. 2,970,714, WIRE RECEPTACLE CONSTRUCTION, patented February 7, 1961 by Lewis E. Glezen, Cleveland, Ohio, assignor to Mid-West Metallic Products, Inc., Cleveland, Ohio, a corporation of Ohio.

This wire receptacle is adapted for tiering and nesting with like receptacles, with the supporting surfaces constructed of wire.

* * *

No. 2,970,733, WIRE FEEDING APPARATUS, patented February 7, 1961 by George W. Soderman, Alpine, N. J., assignor to Western Electric Company, Incorporated, New York, N. Y., a corporation of New York.

The apparatus includes devices to prevent retrograde movement of the wire by positively-actuated grippers.

* * *

No. 2,971,255, METHOD OF SPINNING CABLES FOR SUSPENSION BRIDGES, patented February 14, 1961 by John E. Nixon, Langhorne, Pa., assignor to The Colorado Fuel and Iron Corporation, a corporation of Colorado.

There are 19 claims in this patent concerned primarily with the procedure followed in adjusting the wires, as they are spun, to insure their uniformity of length, in each span, with the other wires entering the strand of the desired length necessary to conform with the prescribed catenaries.

* * *

No. 2,971,286, FOLDABLE WIRE BOOK STUDY DEVICE, patented February 14, 1961 by William B. Ernst, Owatonna, Minn., assignor to Protector Mfg. Company, Owatonna, Minn., a corporation of Minnesota.

The main frame of the device is formed of wires.

* * *

No. 2,971,543, WIRE MESH MACHINE, patented February 14, 1961 by Theodore W. Glynn, Kingsport, Tenn., assignor, by mesne assignments, to American-Saint Gobain Corporation, Wilmington, Del., a corporation of Delaware.

More particularly, the invention relates to welded wire mesh in which the wires are disposed diagonally, making two strips of mesh simultaneously. There are 11 claims.

* * *

No. 2,971,706 VARIABLE PITCH COIL WINDING MACHINE, patented February 14, 1961 by Edward A. Ellis, Reading, Edward T. Stocker, Groveland, Robert A. Waddell, Winthrop, and Richard R. Whipple, Haverhill, Mass., assignors to Western Electric Company, Incorporated, New York, N. Y., a corporation of New York.

The patent relates more particularly to machines for wire winding of spool-type single-layer coils and precision-spaced grids for electron tubes so as to provide a coil having any prescribed value of inductance.

* * *

No. 2,971,707 CUTOVER MECHANISMS FOR STRAND REELING INSTALLATIONS, patented February 14, 1961 by Harry R. Jacobs, Jr., Omaha, Nebr., assignor to Western Electric Company, Incorporated, New York, N. Y., a corporation of New York.

During the cutover operations the mechanism allows the reels to be driven at different rotational speeds.

* * *

No. 2,971,708, APPARATUS FOR CUTTING OVER BETWEEN TAKE-UP REELS FOR A STRAND, patented February 14, 1961 by Judson N. Detrick, Chicago, Ill., assignor to Western Electric Company, Incorporated, New York, N.Y., a corporation of New York.

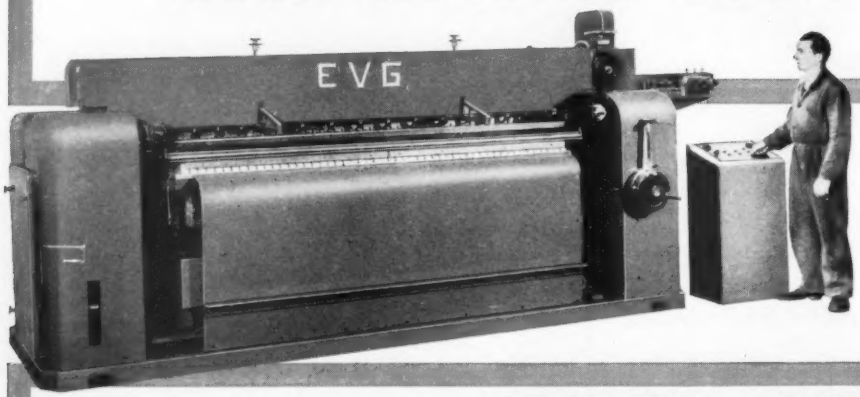
The wire is snagged at preselected points said to be designed to produce a relatively uniform wire speed at all times and to reduce stretching of the wire during the cutover operation.

* * *

No. 2,971,709, APPARATUS FOR CONTINUOUSLY REELING STRAND MATERIAL, patented February 14, 1961 by Benjamin C. Ellis, Jr., Baltimore, Md., assignor to Western Electric Company, Incorporated, New York, N. Y., a corporation of New York.

One of the primary objects of the invention is to permit continuous reeling of a wire strand at constant speed and without imposing injurious stresses or changes of stress upon the wire. Thirteen claims.

COMPLETE LINE OF FULLY AUTOMATIC MESH WELDING EQUIPMENT



EVG designs and builds the world's most complete line of wire fabric welding machinery—five complete plants covering the entire field of welded mesh. Wire sizes from 7/0 to 25 gauge; all conventional spacings, down to 4 mesh (¼" x ¼").

Special plants can be engineered to customer's specifications.

EVG

COVERS THE WHOLE FIELD OF WELDED WIRE FABRIC

1. **Heavy Duty** model G 6 — designed to handle the heaviest meshes in use, i.e., pipe meshes.
2. **Standard Duty** — handles all constructions specified by engineers for reinforcing road fabrics.
3. **Medium Duty** — a specialized machine for the low-cost production of building mesh and similar fabrics.
4. **Light Wire** machine — a high precision welder, specifically designed for the production of visual type fabrics; fencing, mink batteries, etc.
5. **Fine Wire** machine — an extra high speed, flexible changeover welder. Particularly suited to the production of welded hardware cloth in all gauges and spacings.

Please direct inquiries to: **RICHARD E. KLEINHANS** *U. S.—Canadian Representative*

122 East 42nd Street, New York 17, New York • OXford 7-0770

No. 2,971,710, APPARATUS FOR CONTINUOUSLY REELIING STRAND MATERIAL, patented February 14, 1961 by Tillman Tenney Bunch, near Ashland, Md., assignor to Western Electric Company, Incorporated, New York, N. Y., a corporation of New York.

Objects of the invention are somewhat along the lines of the above patent 2,971,709. The full reel is slowed down for a period during which the wire strand is transferred from the full reel to an empty reel to provide slack in the strand for implementing the transfer. Fifteen claims.

* * *

No. 2,971,711, APPARATUS FOR REELING STRAND, patented February 14, 1961 by Charles E. Hauer, Baltimore, Md., assignor to Western Electric Company, Incorporated, New York, N. Y., a corporation of New York.

Automatic transfer to an empty reel of a wire strand which is being wound upon a take-up reel, which has become filled, is effected without stopping the reeling apparatus.

* * *

No. 2,971,712, TRANSFER DEVICES, patented February 14, 1961 by Harry R. Jacobs, Jr., Robert F. Minehart, and John F. Sheehan, Jr., Omaha, Nebr., assignors to Western Electric Company, Incorporated, New York, N. Y., a corporation of New York.

The device is positioned between and extending radially beyond reel flanges in a position engagable with the wire strand material fed by a distributor from a full to an empty reel.

* * *

No. 2,971,713, SNAGGING DEVICES FOR STRANDS, patented February 14, 1961 by George E. Henning, Baltimore, Md., assignor to Western Electric Company, Incorporated, New York, N. Y., a corporation of New York.

Strand material may be removed readily from the snagging devices without damaging the devices.

* * *

No. 2,971,719, WELDED WIRE FABRIC REELING MANDREL, patented February 14, 1961 by Donald P. Cochrane, Brecksville, and Albert L. Stoeckel, Euclid, Ohio, assignors to United States Steel Corporation, a corporation of New Jersey.

A pivotal arrangement of wire fabric anchoring and winding hooks on a mandrel is provided which facilitates removal of the wire coil fabric from the mandrel after winding. Ten claims.

* * *

No. 2,971,873, METHOD OF MAKING HEATER CORDS, patented February 14, 1961 by Russell Winkelman, Richmond, Ind., assignor to Belden Manufacturing Company, Chicago, Ill., a corporation of Illinois.

Applied about heat-resistant vulcanized elastomer jackets on the stranded wire conductors are axially extending stripes of a fluid mixture of a latex rubber adhesive and a thinner with a spirally wrapped layer of asbestos serving over each of the jackets after the fluid mixture has been applied thereto and before the thinner has evaporated thereby spreading the adhesive over a major portion of the surface of the jackets. An outer covering of braided fabric is tightly wound about the assembly so as to compress the assembly into a generally circular cross section.

* * *

No. 2,972,453, VERTICAL COIL MOUNTING REEL, patented February 21, 1961 by Edwin J. McIlvried, P. O. Box 49, Cuyahoga, Falls, Ohio.

The apparatus is adapted for mechanically assisting in the disengagement of a coil of rod and the like from a crane lifting hook so that the coil may descend, onto the supporting reel, into position for pay-off.

* * *

No. 2,972,454, WIRE REEL DIVIDER, patented February 21, 1961 by Edward J. Lord, R.F.D. 6, Farmville, Va.

This apparatus is used for reclaiming wires or cables on a collapsible-type power reel.

* * *

No. 2,973,185, BARBED WIRE, patented February 28, 1961 by Rudolf Josef Georg Brixner, Herrenhaus, Witzhave, Stormarn, Germany.

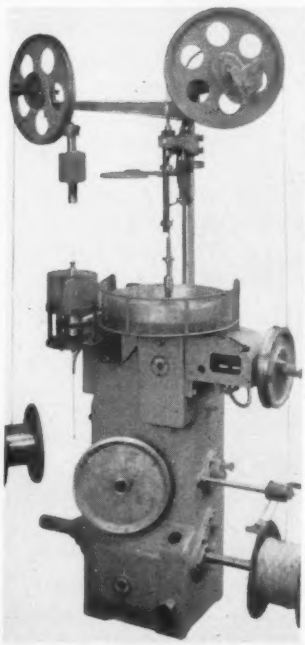
Two-wire barbs are wound on a pair of slightly spaced-apart parallel main wires, thus providing four barbed ends to each barb.

Spring-Tension Fastening Devices

A new brochure issued by **Associated Spring Corporation,** Bristol, Conn., summarizes in four pages the various classes of spring-tension fasteners. Illustrations show customized designs for clamps, clips, latches and locks, pins, retainers, snap rings, hooks and holders, catches, spring washers,

FOR TELEPHONE CABLES

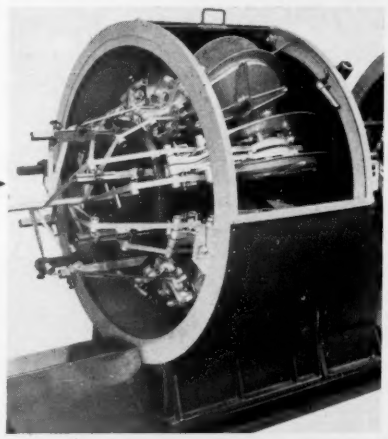
High speed insulating machines



- Paper spindle at 3000 r.p.m.
- String spindle at 8500 r.p.m.
- Paper disc 300 mm
- Traversing take-up reel
- Predeterminating counter
- Automatic stop motion
- 1000 units actually running

FOR HIGH VOLTAGE CABLES

Taping head with 16 papers



- Constant tension braking
- 500 mm paper disc diameter
- Automatic stop motion
- Moveable paper disc for cable diameter variations
- Speed 100 to 350 r.p.m. with speed changer
- Adjustable die

POURTIER MACHINES

76 à 82 rue de la Fraternité

ROMAINVILLE (Seine) FRANCE

SALES AGENT FOR NORTH EAST STATES: WEMPUMPS, 1168 South Olden Ave., Trenton 10, N.J. (U.S.A.)

hangers, and collars. Case-history examples demonstrate how spring-like flat stampings can simplify design, cut costs, and improve reliability.

* * *

Technical assistance is offered in design, development, and production of custom fasteners engineered to perform a multiplicity of functions. Seventeen manufacturing divisions and sales offices help to assure quick service and delivery.

Resistance Wire Improved

New standard limits for Temperature Coefficient of Resistance of ±5 parts per million per deg. C for KARMA* fine resistance wire, used in precision resistors and potentiometers, has been announced by **Driver-Harris Company,** Harrison, N. J. Available in sizes of .00275" and finer, the improved T. C. KARMA offers less change in resistance over the range —65 to +150 C. The previous industry standard was ±10 ppm.

* * *

In addition, KARMA wire in all sizes, .00045" to .010", has improved stability of resistance. Field tests have proven drift from specified resistance was so slight that manufacturers of precision resistors testing the improved wire found it unnecessary to process trial bobbins before production.

* * *

Marked improvement in linearity is another feature. Field tests have shown KARMA now has a linearity variation not exceeding 0.002% in 500 ft. Individual spools will not vary more than 1%.

* * *

Greater strength provides higher insurance against breakage during winding. With less breakage and, therefore, less short piece wastage, greater economy in winding results. Greater strength also makes possible larger minimum weight spools.

* * *

The improvements in the electrical and physical properties of KARMA represent a major breakthrough in research and development, achieved by new processing techniques. Driver-Harris is the first fine wire manufacturer to vacuum melt its alloys for maximum purity and reliability.

* * *

For additional information, write Driver-Harris Company, Harrison 3, N. J.

---

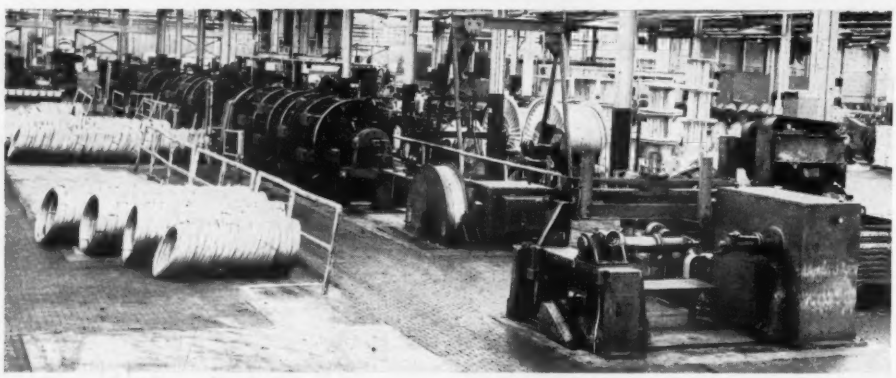
* Alloy 1B, ASTM B267-60T
* Reg. T.M. U.S. Pat. Off.

KARMA — General Properties

Basic Composition	**76 Ni-20 Cr + Fe + Al**
Specific Resistance	**800 Ohms/circular mil foot**
Coefficient of Expansion	**13.3 x 10^{-6} (20°C to 200°C)**
Specific Gravity	**8.10**
Mean Temperature Coefficient of Resistance	**O, ±5 parts per million**
Temperature Range	**—65 to + 150 C**

USED STRANDER AVAILABLE

1-SYNCRO MACHINE COMPANY 61-WIRE, 22" DIAMETER PLANETARY STRANDER, CONSISTING OF:



1 — 6-BOBBIN SECTION
1 — 12-BOBBIN SECTION
1 — 18-BOBBIN SECTION
1 — 24-BOBBIN SECTION
ARRANGED IN TANDEM
1 — 72" DIAM. SINGLE CAPSTAN
1 — 84" TAKE-UP STAND

THIS MACHINE IS COMPLETE IN EVERY DETAIL AND CAN BE SEEN

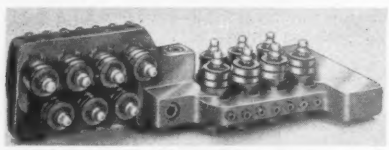
WRITE!! WIRE!! PHONE!!

WEST COAST:
WESTERN WIRE & TEXTILE MACHINERY, INC.
228 SHAW ROAD
SOUTH SAN FRANCISCO
CALIFORNIA — JUno 9-1101

EAST COAST:
WIRE & TEXTILE MACHINERY, INC.
331 ROOSEVELT AVENUE
PAWTUCKET
RHODE ISLAND — PAwtucket 2-7750

New Wire Straighteners From Durant

A new series of wire straighteners featuring adjustable rolls and needle bearings are currently being offered by **The Durant Tool Company.** Precision engineered for straightening flat or round wire as well as wire with irregular cross sections, the new Durant straighteners consist of two sets of 5, 7, 9, or 11 grooved rolls set at right angles to remove material curvature on both planes. These rolls can be grooved to the exact diameter of the wire or can be V grooved for handling a wide range of sizes. Available in 5 standard and 2



heavy duty models and designed for use with automatic feeds, these straighteners can be mounted on Slide Feeds, Roll Feeds or Hitch Feeds. The manufacturer, Durant Tool Company, 15 Thurbers Ave., Providence 5, R. I., offers free literature.

Handy Wire Flattening Calculator

The Fenn Manufacturing Company, manufacturers of precision wire flattening mills, has developed a Roll Pass Calculator for determining approximate starting round sizes for flat wire sections and the number of passes required. They are available while the supply lasts, by writing to **Reese H. Harris,** The Fenn Manufacturing Co., Fenn Road, Newington, Conn.

Rome Cable to Produce In California

Aluminum Co. of America's Rome Cable Division announced it has established a new electrical cable production facility in East Los Angeles, Calif., to meet the growing needs of the missile, rocket and electronic instrumentation fields.

A. D. R. Faraser, Rome Cable president, said the new Special Products Facility will handle custom fabrication of cable and cable assemblies to customer specifications.

Symposium on Applied Radiation and Radioisotope Test Methods—STP 268

The potentialities of radioisotopes in testing procedures and analysis have been known for many years. This symposium represents, however, the first concentrated effort to develop some proposed ASTM methods of analysis and testing involving the use of radioisotopes as analytical tools. It was intended to stimulate activity not only in other ASTM Committees, but throughout the entire field of analysis, and that by suggesting ways in which methods involving radioisotopes might be applied to current test methods and research problems, the techniques could be advanced.

* * *

the latest HIGH SPEED
TUBULAR STRANDING MACHINE
from HANSON & EDWARDS . . .

. . . for the cable and wire rope industries.

* External wire guides increase efficiency—reduce "down-time"—provide quick, easy threading.
* Overall dimensions reduced—increased speed.
* Electro-mechanical or electrically operated air brakes to choice.
* Rotor runs in large split roller bearings.
* Direct gear-driven capstan gives positive lays.

19-12½ bobbin machine, one of the new models now in production. The capstan unit, with cantilever mounted haul-off sheaves, is a complete separate unit coupled by shaft and flexible coupling to the main machine.

HANSON & EDWARDS LTD
WARRINGTON ENGLAND
SALES ORGANISATION:
JAMES DAY (MACHINERY) LTD 28 MADDOX STREET LONDON W1

U.S. AGENTS:
THE EDMANDS COMPANY 880 WELLINGTON AVENUE CRANSTON 10, R.I.

P5078

The papers cover reasonably well developed radioisotopes test methods. Methods were aimed to fulfill the needs of specific industrial testing problems, and the written paper was to be developed as a "proposed" ASTM Method. The benefit of the radioisotope method, as compared with existing competitive methods, was to be highlighted so as to stimulate interest and lead to ultimate adoption of the technique as an accepted routine test procedure.

The Symposium was sponsored by ASTM Committee E-10 on Radioisotopes and Radiation Effects. The published volume is well illustrated and contains numerous references. 112 pages, 6″ x 9″, $3.75 per copy. Order from **American Society for Testing Materials,** 1916 Race St., Philadelphia 3, Pa.

Translations Available

These translations, made by The British Iron & Steel Industry Translation Service, The Iron & Steel Institute, 4 Grosvenor Gardens, London, S.W.1, England, are available at the prices indicated.

1705 Production, properties and economic importance of rimming open-hearth steel
P. NETTER
Neue Hütte, 1960, Feb., pp. 63-69. (£5 5s. od.)
Advantages and disadvantages of killed and rimming steel. Strength properties and notch impact strength. Importance of rimming steel for the national economy. (Author's summary.)

1634 The effect of an increased iron sulphate content in sulphuric acid pickling solutions on the technological properties of pickled wires
C. EISENHUTH and M. MARTIN
Stahl und Eisen, 1959, Dec. 10, 1862-1867. (£4 5s. od.)
The use of low and high contents of iron sulphate for pickling wire in sulphuric acid pickling solutions. The determination of bending, torsional and necking values before and after the pickling. Analysis of changes of the values. The effects of the pickling solution on the quality of the wire. The connections between pickling techniques and waste water. (Author's summary).

1741 The effect of oxygen on the quality of rimming steels
I. PROCHAZKOVA
Hutnik (Prague), 1958, (2), pp. 51-53. (£3 5s. od.)
The effect of FeO content, pouring rate and other variables on the yield per ingot of rimming steel is discussed. The maintenance of a correct oxygen content through control of the process variables, particularly in the deoxidation stage are shown to be necessary for high yields. (Abstract F.I.S.I., 1959, Feb., p. 201c.)

1719 Contribution towards the knowledge of the behaviour of hydrogen in steel
W. HOFMANN and G. VIBRANS
Mem. Sci. Rev. Mét., 1960, Feb., pp. 88-90. (£2 0s. od.)
This paper completes a study presented by one of the authors at Braunschweig several months ago. This study concerned a steel killed at 0.22%C, containing varying hydrogen contents as a result of different additions. These contents were measured by means of an apparatus which had been previously calibrated by the authors. After the gas had been removed at 650°C under a vacuum of 10^{-4} Torr, the pressure and volume of the gas liberated were measured. In order to measure the hydrogen, part of the gas was forced back into a small tube fitted with electric heating. The hydrogen content was calculated from the thermal conductivity of the gas at a pressure of 20 Torr. In order to standardize this measuring device, the quantity of hydrogen was measured in the form of H_2O. (Author's summary).

1789 The influence of phosphorus and nitrogen on the hardness of low carbon rimming steel after different pre-treatments
A. DREVERMANN
Stahl und Eisen, 1960, 80, June 9, pp. 801-809. (£5 15s. od.)
Investigations were carried out on rimmed basic converter steels, special steels refined with oxygen-enriched blasts and open-hearth steels with 0.04—0.12%C and on pure iron in order to determine the influence of increasing phosphorus contents (up to 0.152%) on hardness after normalising, quenching, cold upsetting and tempering. Phosphorus and nitrogen segregation. (Author's summary.)

1743 Operational investigations on the influence of the drawing temperature on the mechanical properties of drawn steel
F. SCHWIER
Stahl. u. Eisen, Oct. 1st, pp. 1385-1391. (£4 15s. od.)
As a result of increased drawing speed and the use of multi-die machines, the steel work-hardens more during wire drawing than at lower speeds in single-die machines. Consequently, as a harder wire requires a greater work of deformation in drawing than a softer one, the temperature of the wire in modern machines is very much higher. The effect of temperature, additional cooling and of a surface pass on wires produced by six works was studied. A surface pass or a straightening operation can improve

Agent: **M. WIMPFHEIMER & SON, INC.** 250 WEST 57th STREET, NEW YORK 19, N.Y. TEL. CIRCLE 6-9384

the mechanical properties in cases where cooling was not properly carried out; naturally correct cooling ensured the best properties. (F.I.S.I. Abstract.)

New Power Cable In New England

When today's junior miss becomes a senior Mrs., she is going to have an insatiable appetite for electrical energy—a major problem confronting America's electrical utilities.

* * *

A mammoth aluminum cable, such as the one pictured with this young homemaker, provides a possible solution for one aspect of the problem of getting more kilowatts to more people. Designed and manufactured by **Aluminum Company of America,** the cable started its "trial run" in December in the Berkshires near Pittsfield.

* * *

The new power conductor is part of a prototype transmission system called "Project EHV" (Extra High Voltage). It will be operated at up to 75,000 volts. Built under the sponsorship of **General Electric Company,** this project seeks information to aid utilities in determining how best to supply tomorrow's vast anticipated power requirements.

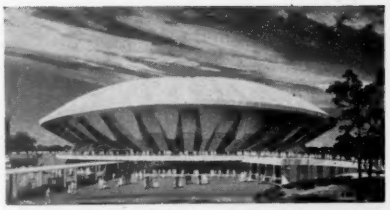
Alcoa's king-sized conductor is 2.32 inches in diameter. It has sufficient electrical current-carrying capacity to supply the power needs of 1,500,000 homes.

* * *

The new cable is contrasted in the picture at left with a typical conventional conductor. Called "Dove" in the electrical industry, this conductor is less than an inch in diameter, operates typically at 115,000 to 130,000 volts. Its giant new cousin has 16 times its power conducting ability.

Stadium Dome Reinforced With Wire

Next year the University of Illinois will have a new indoor stadium, an inverted truncated-cone covered by a dome. No pillars or columns will support the dome, but it will be supported by a 400′-diameter post-tensioned concrete beam



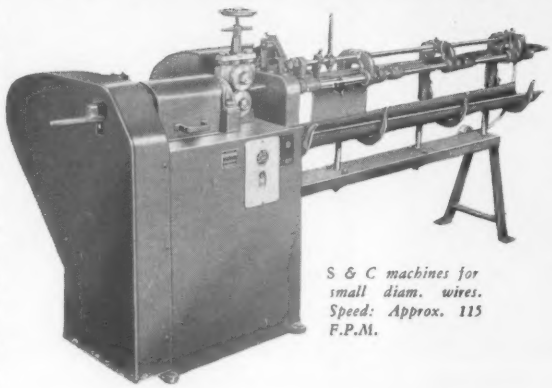
integral with the upper edge of the trancated cone. The outer circumference of the 20 sq. ft. beam will be wrapped with 600 miles of prestressing wire to enable the relatively light structural member to carry the dome.

* * *

New! Improved! Fast!

WELLS

STRAIGHTENER & CUTTER



S & C machines for small diam. wires. Speed: Approx. 115 F.P.M.

This completely redesigned line combines maximum efficiency with that rugged dependability, for which WELLS S & C machines have become justly famous.

Built in several sizes to handle 2 to 18 ga. basic and high carbon wire.

FEATURES

The guide bar of these new machines can be supplied for any cut lengths • The rotary flier runs on ball bearings for smoothness and long life • Cut-off is actuated by a solenoid for extreme accuracy of cut lengths • A two point cam construction provides a quick and positive return of the cut-off knife, eliminating the need for a clutch and dog • A counter is standard equipment.

A COMPLETE RANGE OF S & C MACHINES IS MADE BY WELLS FOR ALL SIZES OF WIRE. SEND FOR CATALOG ON THE COMPLETE LINE.

Frank L. Wells Company

BUILDERS OF FINE WIREWORKING MACHINERY

5821 FIFTH AVENUE • KENOSHA, WISCONSIN

OR — HARVEY SPRING MFG. CO. — 671 N. Sangamon St., Chicago, Ill.

In prestressing the concrete edge beam, **The Preload Co., Inc.,** New York, N. Y., will use a special self-propelled wire winding machine developed for the job, having two wheels that will ride the top surface of the dome-support ring, and two riding the outer face. The machine will be guyed to a point at the center of the stadium and will travel around the ring 2,500 times, wrapping layer after layer of high tensile steel wire. The wire will be drawn as it it wrapped through a die from .236" to .208" in diameter.

* * *

The Preload prestressing operation will apply an initial inward force of 63,700 lbs./ft. to enable the ring to take the thrust of the dome.

Translations Available

The British Iron & Steel Industry Translation Service, The Iron & Steel Institute, 4 Grosvenor Gardens, London, S.W. 1, England, has issued a new list of translations. Those of which may interest wire industry men are given below. These may be ordered from BISITS at the prices following each.

1916 High temperature behavior of Cr-Mo-V steels: The influence of thermal treatment—comparison between the results obtained on rotors and on bars for high temperature bolts
C. ROQUES and LE CREUSOT
Paper No. 22 (£2 5s. od.)

1887 The notch sensitivity of a Cr-Mo-V steel for bolt work operating at elevated temperatures
X. WACHE Paper No. 23 (£3 15s. od.)

1890 Load on roller bearings in the stands of continuous rod mills. (With Discussion)
H. MUNNICH
Stahl u. Eisen, 1960, Aug 18, pp. 1136-1147 (£9)
The use of four-row roller bearings in the stands of continuous rod mills. Load on the bearings as a result of roll forces. Tilting moments on the bearings through restriction of free adjustment of the chocks. Measurement of tilting moments. Proposals for reducing tilting moments. (Listing of Contents.)

1809 Thermoelectric method of measuring the metal surface level in continuous casting
A. ELKERSHAUSEN
Neue Hütte, 1960, Jan., pp. 31-36. (£4)
The method described depends on the measurement of the rise in temperature of the mould wall, and has been used in in a 3-strand plant for several months. The possibility of combining the measuring equipment with a system for automatic control of metal level in the mould is discussed. (Abstract J.I.S.I.)
Giesserie, 1959, Oct. 22, pp. 718-722. (£2 5s. od.)

1920 Continuous casting. (a) Iron and steel. (With a world list of installations)
A. WITTMOSER

B & F Carter Expands Albion Works

Land of approximately 6,500 square yards adjoining the present factory was acquired in 1958, when premises housing modern Jig and Tool Department and a Research Establishment were completed.

* * *

The latest project entails three new bays, each 150 feet long by 40 feet span, equipped with overhead cranes.

* * *

The first bay already in progress, is allocated entirely to steel fabrication and construction.

* * *

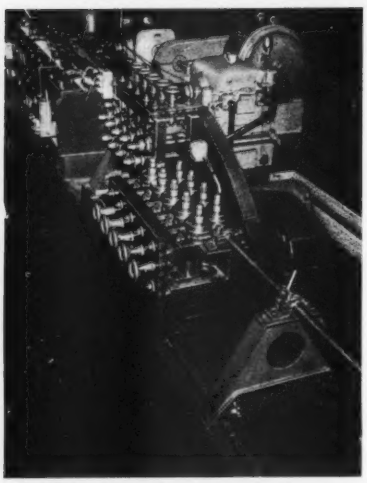
New Managerial and Drawing Offices are nearing completion and full order books ensure full working capacity for a considerable period ahead.

* * *

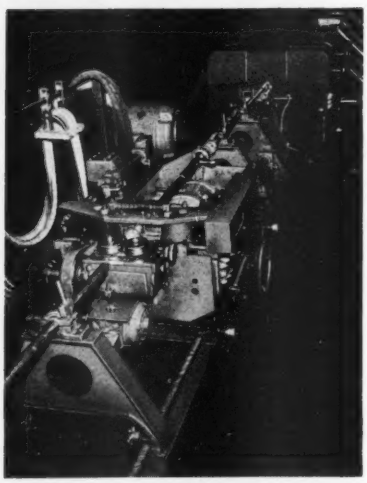
B. & F. Carter & Co. Ltd., Bolton, England, are manufacturers of machines for braiding, knitting,

LOMATIC

COMBINED DRAWING STRAIGHTENING CUTOFF AND POLISHING MACHINE



Payoff - Drawbench - Straightener



Flying Shear - Polisher - Discharge

Now available in two standard sizes, the revolutionary LOMATIC machines handle ferrous and non-ferrous rods and tubes at speeds up to 200 ft. per min. and with drawing capacities up to 16,000 lb. Compared to conventional separate rod drawing, straightening, polishing and cutting-to-length operations, the LOMA single-operation fully automatic machine offers the following major advantages:

- Greater output rate — continuous operation at high speed
- Reduced labor cost — only one operator required
- Improved straightness — stock is straightened in two planes
- Perfect concentricity — obtained by straight-line drawing action
- Higher surface finish — due to two-stage polishing unit

The complete line comprises an uncoiler, a pre-straightener, a drawbench, a roller straightener, a flying cutoff, a polishing machine and a discharge table. All components required for the complete sequence of processing operations are interlocked mechanically and electrically into one integrated and synchronized line which is controlled by only one operator.

Our standard line of equipment includes:

- Casting Machines and Molds
- Saws and Cut-off Machinery
- Hot and Cold Rolling Mills
- Rod and Tube Draw Benches
- Roller and Stretcher Levellers
- Air and Hydraulic Tube Testers

LOMA
MACHINE MFG. CO., INC.
114 East 32nd Street
New York 16, N. Y.

winding, twisting, stranding, cabling, measuring, and other accessory operations.

Revolutionary New Swaging Process

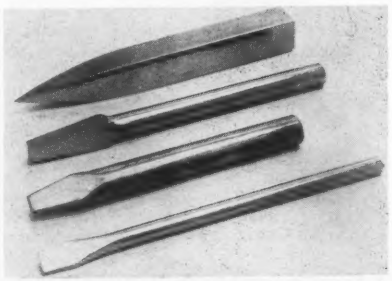
The Fenn Manufacturing Company, leading producer of precision metal forming machines, has developed a new swaging machine creating many new applications for swaging never before possible.

* * *

The new Fenn swager, Model 4FS, makes square, rectangular, tapered and formed cross sections not possible with other types of swaging machines. Finished parts, such as Harrow Spikes, Auger Bit Shanks, Soldering Iron Tips, and Screwdrivers, can be produced from entry rounds, squares or rectangles in one complete operation, and, according to the manufacturer, provides the lowest cost method for making such items. Parts are accurately formed to close tolerances and are free from fins or flashing, thus requiring no additional machining.

* * *

In addition to sharing all the advantages of the Fenn standard line of swagers, Model 4FS is also ideal



Typical parts made simply and inexpensively with revolutionary new Fenn swaging process.

for pointing rectangular shapes prior to drawing, and for reducing squares, rectangles, to smaller sizes of the same shapes. The inherent construction of the new machine provides greatly reduced noise level.

* * *

For complete information, write to **John H. Charpentier,** The Fenn Manufacturing Company, Fenn Road, Newington, Conn.

New Shipping Container Protects Fine Magnet Wire

A unique shipping container for spools of ultra-fine magnet wire has been developed by **Rea Magnet Wire Company, Inc.,** Fort Wayne, Ind., subsidiary of **Aluminum Company of America,** to protect the delicate and costly product it contains.

* * *

The package consists of two mating units intricately molded of expandable bead polystyrene. Sixteen recesses in both base and lid securely hold standard fine-wire spools. It is sealed with tape, requiring no banding or external container.

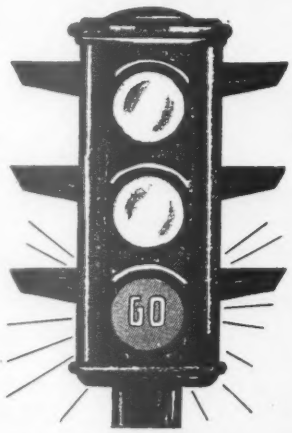
* * *

The new Rea container replaces wood or cardboard boxes, filled with shredded cushioning material. It eliminates possible damage to the wire caused by abrasive contact between spools or cushioning material and the thinner-than-hair wire on the spools.

* * *

Molded of "Dylite", the container was designed by Rea in conjunction with the Plastics Division of

PICKLING PROBLEMS?



GO! GO!

with NEP 33 for pickling

- SPRING WIRE
- ALLOY WIRE
- COPPER COATED WIRE

For finer quality in your Drawing Room

SPECIFY

NEP 33 INHIBITOR

Write for Technical Data
and further information

PARKIN CHEMICAL COMPANY

HIGHLAND BUILDING
PITTSBURGH 6, PA.

Koppers Company, Inc., supplier of the Dylite, and **Aztecs Plastics Co.**, Kenton, Ohio, fabricator of the package.

Palletized Containers for Yarns

New specialized brochure describes the rapidly increasing usage of steel mesh containers for all phases of handling, processing, storage and shipment of textile cones, spools, spindles, bobbins and other packages of yarns, etc. Lists characteristic features, construction and accessories. For a copy, write **Union Steel Products Co.**, Albion, Michigan.

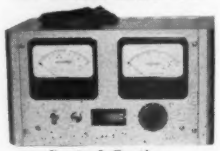
Newark Wire Cloth Appointments

Newark Wire Cloth Company, Newark, N. J., manufacturers of wire cloth and fabricated wire cloth strainers, sieves, etc., announces the appointment of **Charles L. Foley**, 1233 North Main St., West Hartford 17, Conn., as its representative covering Massachusetts, Rhode Island and Connecticut. Mr. Foley is experienced in the design of aircraft strainers and has wide knowledge of filtration and other uses of wire mesh and space cloth.

CABLE HIPOT

- Smaller, lighter, less expensive
- Automatically limited maximum short circuit current (self-protecting)
- Cannot be injured by repeated short circuits
- Simplified controls for easy and rapid cable testing
- KV meter directly at output with field recalibration facilities
- Current meter in grounded return of HV output
- Meters protected against surges and overloads
- Continuously adjustable output voltage
- Selenium rectifiers for ruggedness and long life
- 5 ma current capacity

HV Section Model C-60



Control Section

The average DC Overpotential Tester designed for general purpose insulation testing is unnecessarily complicated and expensive for strictly cable testing.

Peschel cable Hipots have been expressly designed for DC Overpotential Testing of cable (or capacitor charging). Although controls and circuitry have been simplified, safety features have not been sacrificed. Reliability has been enhanced by the elimination of current — interrupting devices. A short circuit merely collapses the voltage to zero and allows a current of 5 ma to flow. A cable failure is indicated by minimum voltmeter and maximum current meter readings.

SAFETY FEATURES • Zero start interlock • HV hold push button with provision to lock in: • External interlock provision • 2 piece construction for test cage use • Automatic output shorting • Grounded HV return • Controls and tank at ground potential • 3 conductor safety grounding input cord and plug • Shielded HV output cable • Surge limiting resistor in HV lead.

Model	Output Voltage KV DC Note 1	Output Impedance	CONTROL SECTION Size W x H x D	CONTROL SECTION Weight Lbs.	HV SECTION Size W x H x D	HV SECTION Weight Lbs. Note 2	Price
C 60	0 - 60	1 Meg.	14 x 8 x 8	20	13 x 12 x 11	90	$840
C 120	0 - 120	5 Meg.	17 x 9 x 11	25	10 x 24 x 16	190	1500

NOTES:

1. For lower voltage units see Peschel Standard Hipot Testers, portable series "S".
2. Weight with oil, however, units are supplied and shipped less oil.
3. Input is 117V, 60 cps, 1 phase.

OPTIONAL EXTRAS AVAILABLE: Multi-range meters; one piece construction; line regulator; Center tap grounded unit for testing 2 conductor shielded or unshielded cable.

INQUIRE ABOUT OTHER TEST EQUIPMENT FOR THE WIRE AND CABLE INDUSTRY.

PESCHEL ELECTRONICS, INC.

PATTERSON. NEW YORK (Putnam County) Tel: TRinity 8-3251

ABSTRACTS

These abstracts are published through the courtesy and with the permission of the Industrial Diamond Information Bureau, 2 Charterhouse Street, London, E.C.1, England. Inquiries regarding them should be directed to the Bureau.

Briefing the Soviet record . . . for producing superfine wire

Anon. *Prod. Engng* 1960 Vol 31 (50) p 9 (Dec 5)

Mentions two different Soviet techniques for producing wires in sizes down to 2 microns. The original system forced molten metal through very small orifices by high-pressure air or inert gases. A magnetic field is now used, the wire being insulated as it is made. A high-frequency magnetic field draws the molten metal up inside a fine glass capillary tube.

The fundamentals of wire drawing (:) 6—Profile of a drawing wire

C. P. Bernhoeft. *Wire Industr* 1960 Vol 27 (324) pp 1197-1198, 1225 (Dec). 1 illustr, 2 tables.

Copper wire drawing lubricants

Anon. *BNF Rev* 1960 (6) pp 14-15 (Nov)

Describes a simple laboratory machine in which lubricants can be subjected to a standard test of their ability to prevent wear between a copper surface rubbing at high speed on a tungsten carbide surface, comparable with that used for wire drawing dies. The accuracy of the machine is at present being assessed. 1 illustr.

Wet drawing machine

J. Klasrepohl, Berlin-Borsigwalde. *Wire World Internat* 1960 Vol 2 (5) p 245 (Oct)

Wet drawing machines are required for the production of wire from 3 mm down to the finest dimensions. All such machines are of the multi-hole type and are available with up to 25 die positions. 1 illustr.

Thinner wires made by rapid process

Anon. *Financial Times* 1960 (22,241) p 13 (Nov 16)

Copper and manganin wires, 1 μ diameter, can be produced at the rate of 600-800 ft/min and in lengths up to 6,000 ft. using a new technique. The wire rod is fed into a glass tube, the lower end of which is surrounded by an induction heating coil. The top of the rod becomes molten when the current is turned on and the metal is drawn out into a wire, solidified by a cooling device. Experiments are being carried out in an effort to produce single crystals of germanium by the same method.

Our Advertisers are Reliable Patronize Them

The Effect of Technical and Educational Development on the Labour Structure of the Wire Industry

(*Continued from page* 461)

be in any other industry without loss of status. The wire worker, no matter how proficient he is at his particular job, is a beginner if he finds it necessary to seek employment in any other industry. He is unskilled except in the industry wherein he learned his job, the apprentice — once his apprenticeship has been served — is always a skilled man. Secondly there is the avoidance of the loss to the Industry of those young people who no longer leave school at fifteen or sixteen but who profit by the opportunities offered for further education and who seek employment as University or Technical College graduates.

* * *

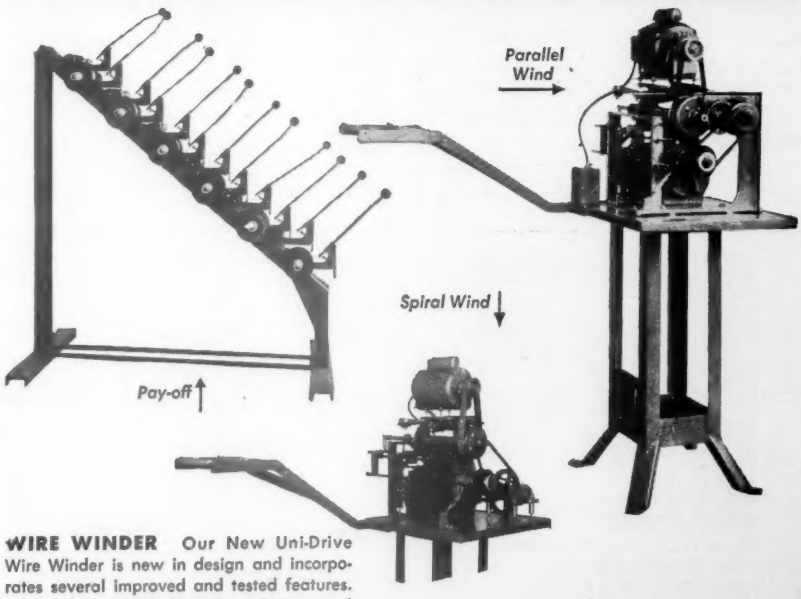
Some firms within the Wire Industry have already taken steps to meet this situation, realizing the need for well-trained workers. One large firm introduced a Youth Training Scheme for junior operatives some eleven years ago. This operates alongside an Apprentice Training School with up-to-date facilities. Boys are recruited at fifteen or sixteen. Most are school leavers and the entrance interviews are timed to follow the school-leaving dates at Christmas, Easter and Midsummer. Quite a number of applicants are the sons or relatives of people already employed by the Firm. The pattern of training allows for a gradual transition from the atmosphere of the school room to that of the workshop floor and, as the boys in the intermediate phase of training spend some weeks in a number of departments, they have at the end of their training a fairly comprehensive knowledge of all the processes carried on in the works. This does not qualify them as the apprentice is qualified to find skilled employment in other industries should removal or other circumstance take them away from the Industry but they are not tied, as was the wire worker of a generation ago, to one particular job.

A parallel course for the systematic training of junior clerks has been introduced more recently and the same firm has; at a level commensurate with the higher responsibilities involved, a scheme in operation for the training of potential managers. This also gives those who pass through it opportunities of spending some time in the various production and service departments of the Firm. In the management Training Scheme it is envisaged that whilst some of its candidates are those who have, as it were, risen from the ranks of the firm's own employees, others will come into the Firm from the colleges and universities through which the country's educational system is increasingly tending to pass the more able members of our young people.

* * *

There is no single panacea which can remedy all the difficulties that face any industry in recruiting and maintaining a body of people who are efficient and progressive. Simple modernity of buildings and machinery would not of itself bring this about. There are many instances of most excellent industrial teams carrying on work in sur-

STANDARD UNI-DRIVE WIRE WINDER



WIRE WINDER Our New Uni-Drive Wire Winder is new in design and incorporates several improved and tested features. Production is stepped up through increased speed. It produces smooth, even and accurately wound spools of wire in single or multiple ends. All strands parallel — no over or under-winding. Can also be furnished with a slight spiral pattern for winding exceedingly fine wire. Automatic Stop Motion controls each strand. Traverse adjustable from 1¾" to 5½" between spool heads without changing cam. Designed especially for winding wire to be braided and shielded for electrical conductors.

Various types of supply packages that may be wound on Standard Uni-Drive Wire Winder.

PAY-OFF Our Pay-off Attachment consists of a heavy fabricated frame on which Pay-off spools are mounted to cover desired number of ends to be wound. Equipped with spindles, running on self-aligning ball bearings, with size of spindles and adapters to accommodate customers' pay-off spool. Compensating Attachment to control the tension of each individual strand of wire, applying the same tension when spool is full as when empty. Can also be adapted for use with bunching machines.

STANDARD MILL SUPPLY COMPANY
31 ESTEN AVENUE PAWTUCKET, R. I., U. S. A.

roundings which leave much to be desired but, nevertheless, such considerations as the equipment with which those engaged in industry work can have a profound effect on the enthusiasm of those who do the work, and can be the means of attracting the more able persons to join the particular industry. Where the modern plant exists it is but commensense to secure this type of people by such means as are available and, once they have been brought in, to give them adequate training so that their full potential is realized.

Thin Film Anodic Aluminum Oxide Insulation on Round and Flat Wire

(*Continued from page* 462)

relative humidity, techniques have been developed to overcome this problem. Since the anodic film is porous and presents a hygroscopic problem in some applications, different organic and inorganic impregnations have been developed to improve its humidity characteristics.

* * *

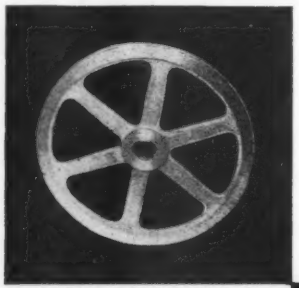
Many leading manufacturers have changed their own specifications of components in order to use the oxide-coated wire. Field reports indicate significant results such as General Electric obtained in high temperature tests on aluminum wire up to 649°C; tests have also been made by Westinghouse Electric Corp.; Whittaker Gyro (on vibration), Institutes of Technology, and U. S. Government Agencies (a WADC technical report where a contract number has been assigned by the USAF).

* * *

Our wire is being used by component manufacturers to improve products, lengthen the life of motors and transformers, eliminate burn-outs, especially when subjected to such high ambient temperatures as heating sources and annealing or melting furnaces, to eliminate excessive maintenance costs and save valuable time. The properties of the insulating film allows for rapid dissipation of heat and is not affected by extreme temperature ranges or thermal shock. For this reason manufacturers of electromagnets, electrical brakes for automobiles and heavy trucks and train regulators are assured of uniform braking when this type of wire is used. This is a new field of considerable promise for the company. Several manufacturers are using the insulated flat wire or strip instead of round wire, because it has a greater cross section to provide the same conductance, since it eliminates about 22% of space value as required in round wire.

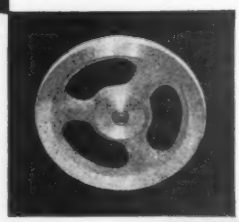
* * *

Since winding consists of a number of turns in flat wire that will equal the number of layers of round wire, it also eliminates the high layer-to-layer voltage requirement. A close compact coil simplifies winding problems and the thin layer of aluminum oxide insulation will save in weight, space and quality of performance. Especially because it is possible to



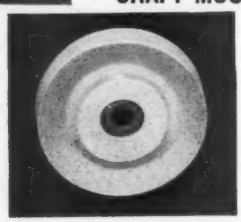
ALUMINUM SHEAVES

These Watkins Aluminum Sheaves offer outstanding advantages of ease of maintenance and long service life when used in gangs to guide wire through enamelling ovens and related equipments. Each sheave is machined from an aluminum casting.
Large sheave is available with single or double groove.



	SMALL	LARGE
V-GROOVE ROOT DIA.	3¼"	8"
SHAFT SIZE	¼"-⅜"-⅜"	⅝"
WIDTH	¼"	7/16"
SHAFT MOUNTING	Oiled bushing	Needle bearing

NYLON
IDLER
PULLEY



The Watkins Nylon Idler Pulley combines the resiliency, high strength and low weight of nylon with the free-turning ball bearing to give outstanding performance wherever pulleys are used in fine wire drawing machinery.

SIZE:
1½" O.D. x 3/16" Wide
SHAFT SIZE:
3/16" Diameter
STYLE:
Single groove
Double groove

Other styles available to suit individual application.

RS WIRE MACHINES

Descriptive literature is available. Inquiries are invited.

R. S. WATKINS & SONS, INC. Glen Road, Sandy Hook, Conn.

get a uniform film both on the width and the edge of the ribbon wire.

* * *

Major problems previously encountered by users of aluminum wire are those of making connections and terminals. Such problems now are eliminated! Through research and experience, our company is able to recommend connection procedures for specific applications. In general, heavy wires are soldered, flat wire is coldwelded or dip-brazed the same as fine wire, or induction heat applied for brazing the wire. Some paste fluxes are available for aluminum and dip-brazing to 1100°F.

* * *

Aluminum oxide film insulation is available from a continuous anodic process. The film is anchored in the pores of the base metal (aluminum), is flexible and uniform, does not craze or peel, and exhibits excellent dielectric properties up to 3600°F. Where aluminum wire is used, space and weight savings are significant. The insulation values of the film remain close to constant through the range of temperatures that the conductor is called upon to withstand. Impregnants and ceramics coatings overcome hygroscopic problems and are helpful in nuclear and high temperature applications.

Fast Heating Accomplishes Uniform Spheroidizing of Heading Stock

(*Continued from page 463*)

of coils placed across its width.

* * *

The trays are advanced through the furnace and discharged by automatic mechanisms operating hydraulically. The operator, using the arbor truck, removes and places the coils with the finished stock, ready for pickling operation.

Uniformity Cuts Testing Requirements

Metallurgical laboratory personnel take periodic tests of the finished stock. When the furnace was first put into operation, every coil was tested; however, it has since been found that uniformity of structure and hardness are now such that only spot sampling is required.

Better Finish Obtained

Chicago Screw has gained several quality and cost advantages in its headed products since this new furnace has been placed in operation. It now has more complete control of product. Also, continuous operation has added to better and more simplified quality control. Experience in the operation of the furnace has shown that structures and hardness can be dependably reproduced by duplicating previously used cycles and temperatures. Utilization of surface, suction type, radiant tubes in the furnace not only provides fast uniform heating, but keeps scale build-up at a minimum. This, in turn, permits faster pickling and cuts product weight loss.

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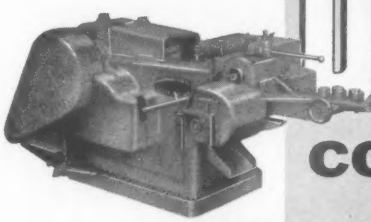

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The high-quality, precisely engineered Greenbat line comprises single, double, and triple stroke machines, and in the design of each model particular attention has been given to ease of maintenance, tool setting, and complete tool interchangeability with machines of different make. Every Greenbat is furnished motorized, and can be supplied with American threads if desired.

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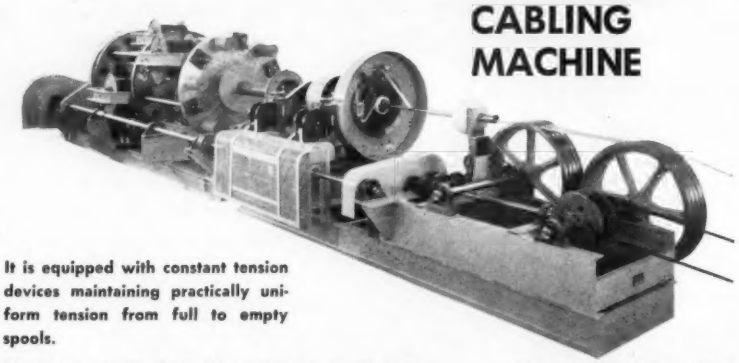
PLANETARY CABLING MACHINE



This Machine Accommodates Reels Up To 24 Inches In Diameter And 16 Inches In Width.

- It is equipped with constant tension devices maintaining practically uniform tension from full to empty spools.
- Operating speeds from 80 to 100 r.p.m. of rotor.
- Power can be supplied either by an induction motor, Warner clutch, and Vee belt drive, or a wound rotor motor, resistors, and Vee belt drive.
- Filling Head for 6, 12, or 18 packages can be supplied.
- Binding Head accommodates four yarn packages 6 inches diameter, 4 inches traverse and is driven through a clutch, counter shaft, and variable speed device.
- The Taping Head accommodates a pad 18 inches in diameter, 1½ inches in width and is driven through a clutch, counter shaft, and variable speed device.
- Capstans are dual 4 groove 36 inches diameter, driven through change gears.
- This Planetary Cabling Machine is one of a number which we have built handling reels 8, 10, 12, 16, 19, 24, or 30 inches in diameter. We can supply standard units to meet practically all requirements.

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Chicago Screw, one of the country's largest individual screw manufacturing plants, is one of six divisions of Standard Screw Company. In addition to many special screw machine and cold upset products, "Standard" markets nationally a complete line of socket, set, and cap screws, machine and carriage bolts, dowel and taper pins, nuts and other standard fasteners under its new tradename "Stanscrew". Installation of the new annealing furnace at "Chicago Screw" has given the fastener industry one of its first continuous coil annealing set ups.

Heat Aging of Chemically Cross-Linked Polyethylene

(*Continued from page 468*)

ically cross-linked materials appear to be no different in this respect. Table V shows the dissipation factor and dielectric constant @ 1MC for the chemically cross-linked low-density (DYNH) compounds (Samples "A", "B" and "I"). Measurements were made on one-inch squares after oven aging. Due to test limitations it is only possible to indicate trends.

* * *

Table V actually makes comparisons of both carbon black and antioxidant content. As an electrical conductor, carbon black promotes

TABLE V

DISSIPATION FACTOR AND DIELECTRIC CONSTANT @ 1MC

		A		B		I	
		D.F.	K	D.F.	K	D.F.	K
100°C.	(14 days	.0218	8.38	.0471	9.22	.000411	2.26
	(28 days	.0243	8.09	.0372	8.84	.000769	2.18
	(56 days	.0365	8.09	.0408	8.93	.000369	2.24
120°C.	(14 days	.0346	9.56	.0386	8.80	.000343	2.26
	(28 days	.0436	10.60	.0303	8.45	.000717	2.23
	(56 days	.0508	13.51	.0246	8.13	.000384	2.22
136°C.	(14 days	.0347	9.66	.0311	8.54	.000361	2.24
	(28 days	.155	11.98	.0209	8.60	.0217	2.70
	(56 days	.256	12.82	.0199	8.06	.0197	2.55

poorer initial electricals (Samples "A" and "B"). However, the material with .5 phr of antioxidant improves electrically on aging, whereas Sample "A" without antioxidant degrades upon aging. The dissipation factor and dielectric constant of the unfilled material (Sample "I") containing .1 phr of "Santonox" R remains about the same until aged more than 14 days at 136 deg. C. At this point they degrade appreciably. In general,

the addition of antioxidant does not improve electrical properties initially, but maintains the level of these properties during extended periods of heat aging.

* * *

Aging appears to have little effect on the Durometer Hardness of chemically cross-linked polyethylene and therefore the addition of antioxidant is not of significant importance. Table VI shows

TABLE VI

DUROMETER VS HEAT AGING

Typical Durometer Hardness vs Heat Aging

	Group 1 Low Density CB Filled		Group 2 High Density CB Filled		Group 3 Experimental Copolymer CB Filled		Sample "I" Low Density Unfilled	
Durometer Scale	A	D	A	D	A	D	A	D
Original	96	56	97	70	95	56	93	50
After 56 days @ 136°C.	92	55	96	70	96	57	93	42

the typical hardnesses measured with Shore Type A and D durometer after 56 days at 136 deg. C.

* * *

All of the chemically cross-linked materials have about the same Shore "A" hardness. The high density compounds, however, have a higher Shore "D" (70 vs 56) while the unfilled DYNH, a lower Shore "D" (56 vs 50). It would appear that the Shore Hardness is a function of formulation and resin density and is affected very little by extended periods of aging.

Conclusion

Chemically cross-linked polyethylene without sufficient antioxidant degrades on heat aging, losing its tensile properties, compression cut-through resistance, flexibility at low temperatures, appearance and electrical properties. This material can be protected, however, with antioxidants to retain sufficient physical and electrical properties to become serviceable over a wide range of temperatures up to 136 deg. C. At least .5 of antioxidant per 100 parts of resin is considered necessary to accomplish this protection against heat aging.

* * *

Additional testing must be conducted to determine the upper limits of antioxidant addition in order to predict longer continuous service use at elevated temperatures.

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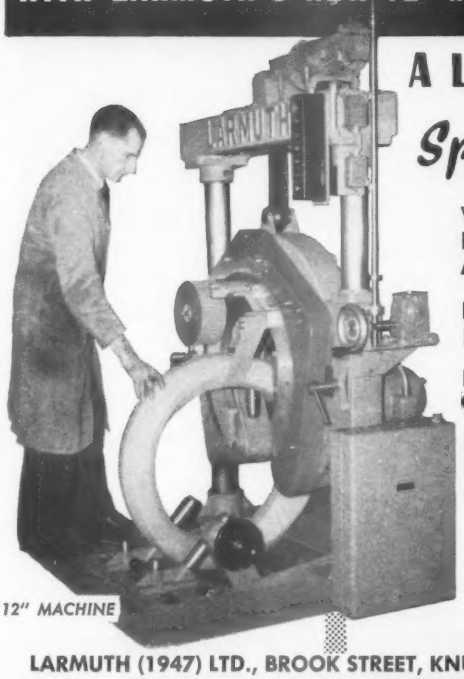

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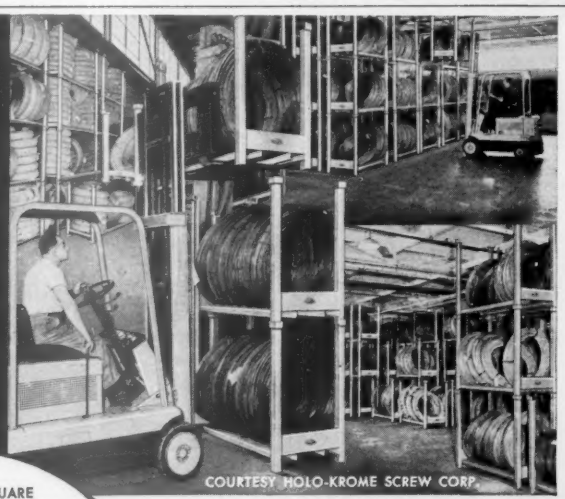
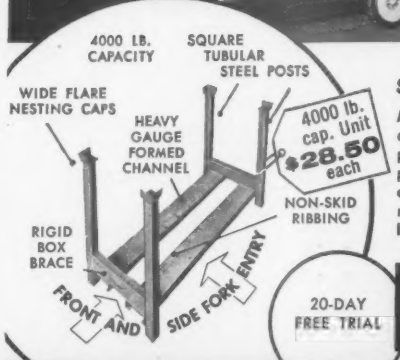
JARKE PORTABLE WIRE COIL RACKS





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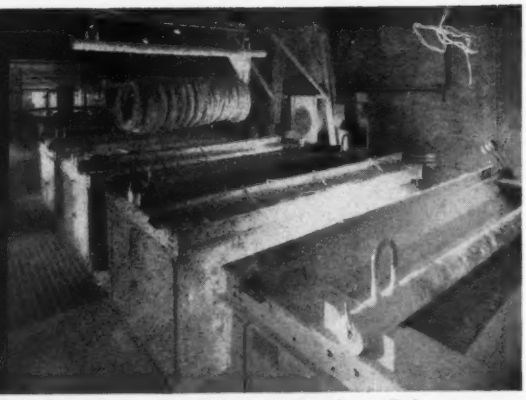

Faster baking, greater fuel economy, maximum production efficiency are just a few of the results of the exclusive heating arrangement of the Carl Mayer Hi-Speed Rod Baker. It also has a patented blow-off feature which removes moisture without damage to coils.

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*

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The future for chemically cross-linked polyethylene is encouraging and the characteristics of this material are such that it should find use as electrical insulation in many areas where wires and cables are subject to abnormal temperatures.

High Vacuum Annealing: Its Use in Steel Wire Drawing and Cold Rolling Mills

(*Continued from page 472*)

angle valve is exchanged as may be expedient for a check valve. In buffer gas annealing, in place of the angle valve a normal gate valve is used. The additional arrangements for a quick change-over from one to another process entails no special outlay.

Output

It sometimes has been said that the performance and economy of the vacuum plant is inferior to that of the conventional plant using buffer gas. It is pointed out that generally the heat is transmitted through radiation and convection; with vacuum furnaces it is only by radiation. It should not be forgotten that the radiation losses of the vacuum furnace through its evacuation are considerably smaller than with an ordinary furnace. Even with annealing temperatures up to 2,000°F the outer jacket will be hardly over 140°F. And the output is insignificantly less than that of the customary furnace. In a furnace of 43 inches clear width and 67 inches stack height, for example, 2½ tons of fine wire are run through in 12 hours, so that the daily output of continuous operation can reach 5 tons. The current requirement for each ton of annealing material is in the bracket of from 130 to 180 KWH. A possibile additional expenditure in power cost is compensated by the almost unlimited life of the plant, i.e., the annealing furnace and the heating coils in it, and through the trifling cost of attendance. Attendance is required at times at the start and end of the annealing cycle for some 8 to 10 minutes. This short attendance time can be attained through the proper con-

struction of pack cylinders and stack crates.

Reducing Annealing

By annealing at a high temperature in a vacuum the scale on hot-rolled sections is changed. In such cases the oxygen escapes from the scale without the introduction of any reducing agent. There then remains behind only a microporous layer of pure iron, which is an extraordinarily good lubricant carrier. The reaction temperature lies about 1,830°F to 2,010° and, indeed, the higher the smaller the carbon content (0.03 to 0.06%).

* * *

With this so-called type of annealing, as a second simultaneous effect, a complete homogenizing of the texture is attained. Frequently complaints are heard that with the steadily increasing weight of the bundles or coils, the strength factors inside the bundles have become quite variable. By reducing annealing a uniform soaking is obtained and consequently an otherwise unobtainable deep-drawable material of superior uniformity.

* * *

This process thus offers the possibility of completely eliminating mineral acid pickling and replacing it by a heat-treatment process. The objection that the annealing process is more expensive than pickling sometimes is made if the processing plant has an installed pickling apparatus and is not bothered by the consideration of having to dispose of pickling acid wastes. The method (annealing) is especially attractive if no pickling plant exists, or if the space conditions demand that the use of acid pickling be limited as far as possible.

About Nails

(*Continued from page* 477)

developing new types of nails for special uses. There are over 400 kinds on the market today.

* * *

One of the newest is the Ardox nail that is made by Jones and Laughlin. It has a spiral shank that turns like a screw when

new

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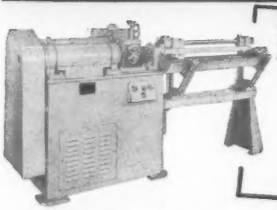
infinite, variable speed, electrically controlled,

Automatic Wire Straightening and Cutting Machine!



CAPACITY: 1/16" to 3/16" high tensile wire and 1/16" to 5/16" mild steel wire, 50 to 200 FPM.

Send for complete details on this high speed, low cost dependable SHUSTER! Ask for our quotes on your wire straightening and cutting needs for any wire sizes from .020" to 1 1/16".

SHUSTERS give you straightened and cut wire *when* you need it, at lower investment than any comparable machines. The right combination to lowered production costs is *coiled* wire plus a dependable SHUSTER. Let one of our sixty representatives (there's one near you) give you the facts. Let us show you how you can materially lower your wire production costs!

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The New Model 1900-HVE Multi-Spindle Spooler (up to 16 Heads), engineered to include a variable speed system for adjustment of spindle speed, pitch, and traverse. This complete flexibility of adjustment makes a very uniform layer wound package which prevents binding and kinking during pay-off.

The 1900-HVE Spooler is a ruggedly built machine, using precision ball bearings at all rotating members. The adjustments are repeatable, and easily made while the machine is running. It is completely adaptable to the changing demands of the wire industry. A speed range of 18 to 1 is available. It contains the knowledge and experience of over 60 years of wire machine building.

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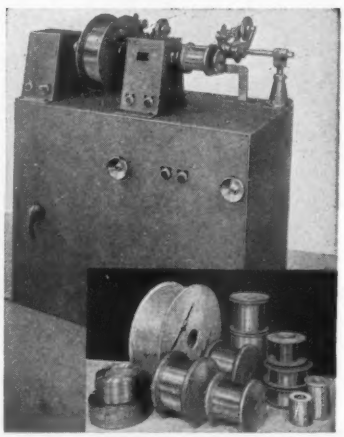
You are invited to consult us on your wire spooling problems. Our engineering resources and years of experience are at your service. Emory Winding Machines have been the standard of the industry. Most every major plant has Emory equipment.



SPECIFICATIONS

Size Range: .010" to .080" or heavier if soft, and many flat wire sizes. Max. Spool Size: 16" flange diam. Capacity: Usually 2 to 6 spindles.

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driven into wood, reducing the danger of splintering. Oddly enough, although it is 30% easier to drive into wood, the Ardox holds nailed pieces together more solidly than any ordinary nail.

* * *

Most people use nails, of course, just for the practical purpose of holding things together.

* * *

But over the centuries, many more interesting uses have been found for them.

* * *

The ancient Romans drove a nail into the wall of the Temple of Jupiter every year on the 13th of September, to tally the year and to ward off plagues and calamities during the months ahead.

* * *

The Roman scholar, Pliny, wrote that it was fatal to sleep under a yew tree unless a copper nail was driven into the trunk. He also suggested treating epilepsy by driving a nail into the ground where the sick man had fallen, to capture the evil spirit that possessed him.

* * *

The belief that practically any kind of illness from a headache on up can be treated by "Nailing of Evils"—driving a nail into a tree trunk, wall, or any other convenient surface, and leaving the ailment behind, firmly nailed down, appears in folklore all over the world.

* * *

One old English recipe for curing the ague advises the sufferer to nail a lock of his hair to a tree and wrenching the lock from his head.

* * *

Another spookier, but less painful remedy, advises the patient to go to the crossroads at midnight, alone, and as the clock begins to strike, turn around three times and drive a tenpenny nail into the ground, then walk away from the spot backwards before the clock finishes the twelfth stroke.

* * *

In the Scottish Highlands, women in childbirth used to be protected from the elves by a row of iron nails on the front of the bed.

* * *

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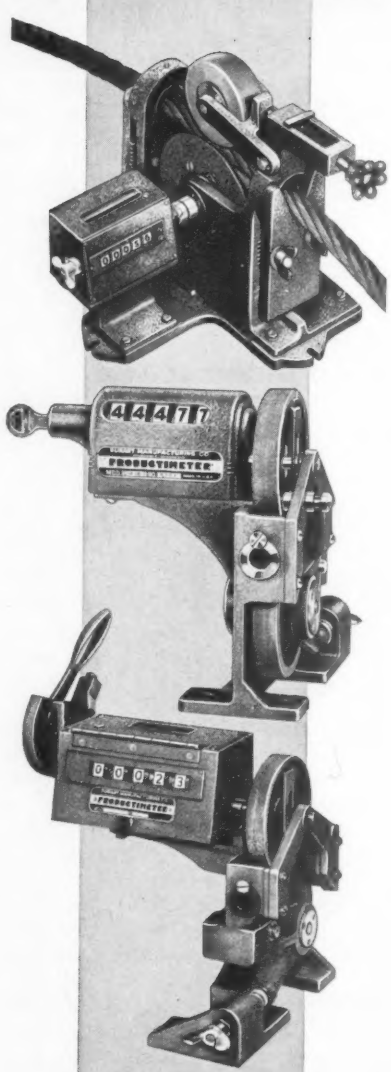

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COUNTING INSTRUMENTS

Nails keep popping up in the proverbs and similes of practically every language, too.

* * *

The Roman dramatist, Plautus, had a character exclaim, "You've hit the nail on the head", in 200 B.C.

* * *

The French story-teller, Rabelais, who may or may not have read Plautus, came up with a similar expression in the 14th Century, and 200 years later, Cervantes' Don Quixote said in Spanish, "I may at last hit the nail on the head." The phrase has been common in English since the 16th Century.

* * *

The expression, "nail in your coffin" for any habit that actually or supposedly shortens life dates from the 18th Century, when the English writer, John Wolcot, decided that:

"Care to our coffin adds a nail, no doubt,
And every grin so merry drives one out."

* * *

"As dead as a doornail" first appears in the 14th Century, in William Langland's **"Vision of Piers Plowman."**

* * *

And then there's the familiar nursery rhyme, known in a dozen different versions:

"For want of a nail, a shoe was lost,
For want of a shoe, a horse was lost,
For want of a horse, a rider was lost . . ."

* * *

Sometimes the rider who takes the fall turns out to be a king who was leading his army in battle, and the verse ends with the loss of battle and kingdom, "all for the want of a horseshoe nail . . ."—probably the most damatic tribute paid to the nail in all its 5,000 years of useful life.

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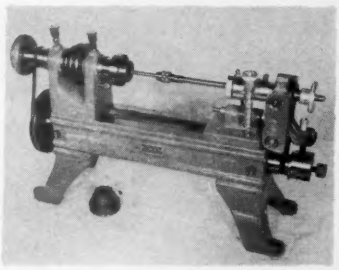

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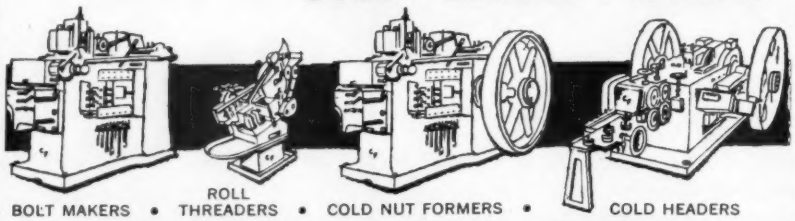

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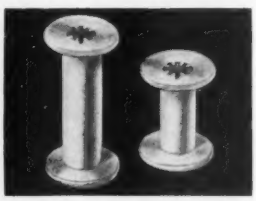

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X-Ray Measurement of Intragranular Misorientation in Metals

(*Continued from page* 482)

One X-ray diffraction pattern is produced by directing an X-ray beam from a copper-target tube through the collimator onto a strongly diffracting single crystal of lithium fluoride in the first crystal mount. This crystal diffracts a narrow monochromatic beam through an angle onto the specimen under study in the second mount. The grains in the oscillating specimen diffract the beam through another angle onto the film, while the film holder is stationary, so that a pattern is obtained. The film is then replaced, and both specimen and film are oscillated while a second pattern is being obtained from the same specimen. Comparisons of the average breadth of the spots in the two patterns may then be made.

* * *

The specimens used in the present work were sections cut from rectangular bar specimens of brass that had previously been extended, extended and compressed, or extended and compressed and again extended, from 1 to 4 percent cumulative strain. Three specimens were sectioned from the reduced area in each bar: one cut parallel to the axis of loading, one perpendicular to the axis, and one cut at a 45-degree angle to the axis.

* * *

The various amounts of strain present, and the average misorientation found for the three sections of each bar specimen are shown in **Table I.** Despite a considerable scatter in the data from which the averages were computed, the largest amounts of misorientation were always noted in the specimens that had been sectioned at a 45-degree angle to the loading axis. This result indicates that the lattice distortion of individual crystallites in a polycrystalline matrix is directly related to their orientation.

* * *

The decreased misorientation found after reversed strain in the present study may be useful in

developing a theory on the reversibility of dislocations in crystallites undergoing small amounts of plastic deformation. One result of particular interest was the linear increase found in residual misorientation at zero net strain with cumulative strain. This phenomenon indicates a non-receivable disorder which may be attributed to the capture of some dislocations at permanent pinning points on the slip planes of a crystal.

[1] For further technical information, see An X-ray diffraction measurement of intragranular misorientation in alpha brass subjected to reversed plastic strain, by C. J. Newton and H. C. Vacher, J. Research NBS 65C, No. 1 (1961).

Truck Leasing

(*Continued from page* 484)

this sum is added to the other costs of company-owned fleet operation, then company fleets are often the most expensive form of transportation.

* * *

There are only two kinds of situations where there is justification for use of company capital in acquiring a truck fleet: (a) the company has more liquid working capital than it needs in the business and can spare the cash for trucks, or (b) the company's return on working capital is so low that it does not pay to lease in order to obtain additional working capital.

* * *

However, where a company can use not only its present working capital but additional working capital in the business, it would be foolish to freeze part of the company's cash in a truck fleet. Truck fleets are available without investment of company capital. They can be leased, as we have seen. True, up until now truck fleets could not be leased without expensive Full Maintenance. But this is now changed. The Finance Lease makes truck fleets available without any extra trimmings.

Suppose a Company Didn't Want To Own or Lease its Trucks Are There Other Alternatives?

The first alternative is common carriers; the second alternative is contract carriers. By using either one, a manufacturer takes himself out of the transportation business.

The use of common carriers is economical in these situations:

a. **Where distances involved are so great that deadheading (a return trip with an empty truck) takes longer than one day.**

b. **Where a company's merchandise commands a low rate from common carriers.**

c. **Where the company's trucking volume at any one time is too small to justify use of owned or leased trucks.**

These conditions apply to many smaller firms, as is witnessed by the fact that the common carriers employ fewer than 10 per cent of the trucks on the road, but move more than 30 per cent of the goods carried in trucks.

* * *

The disadvantages of common carriers are three: their use is quite expensive; they may not be able to do the job desired; and by use of common carriers, a corporation loses control over delivery of its goods. However, common carriers solve the transportation problems for many companies.

* * *

Contract carriers are somewhat different. More or less, they charge the same rate as common carriers, and they can give better service in a small territory. For example, a manufacturer may have 100 delivery points in a limited area or state. A contract carrier would charge much lower rates to make all these stops than would a common carrier. A contract carrier is very close to its client manufacturers and works only for a limited number of clients.

* * *

But the contract carrier is limited in the variety of commodities it can carry, and is hobbled in its rate-making. A contract carrier would be economical to use under certain special conditions:

a. **The contract carrier has a permit to carry the specific commodity which the manufacturer wants to ship.**

b. **There is no long-haul merchandise which requires interline trans-shipping.**

c. **The manufacturer requires a large number of delivery stops within a limited territory.**

d. **The freight is in large, annual volume, fairly regular, and within the limited territory of the carrier.**

* * *

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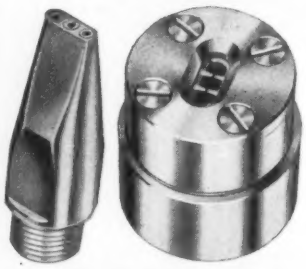

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Under these conditions, a contract carrier is efficient and satisfactory — and would obviate any need to invest cash in company-owned trucks.

Wire Kinks

(*Continued from page* 481)

economics. Semi-killed steel is easily rolled and provides good uniformity from heat to heat, and is easy to draw and form into wire products. The carbon content may be varied from .06 to .20, with the manganese, phosphor and sulfur content remaining within fairly similar limits in the different grades.

* * *

Products that can be made from this steel include field fence line wire, field fence stay wire, barbed wire, stapling wire, rock fastener wire, hanger wire, tie wire, buckle wire, small nails and brads, and other items.

* * *

Corollary effects from the use of this type of steel is a low scrap loss and excellent die life (about 200 tons of steel per die).

New Higher Capacity Balance Developed

A new high capacity Electrobalance® is announced by **Cahn Instrument Company.** It is ideal for weighing small parts, and thus for checking the operation of tabletting presses and other forming machines. It is excellent for determining the denier of fiber, for testing wire size, for weighing samples for routine chemical analysis, and for mixing and blending materials. Precision is so high it can be used to check the amount of material removed in grinding, amount added in plating small parts. It offers major advantages over previous torsion-type balances used in industry.

* * *

The new Electrobalance weighs samples up to 1.2 grams to an accuracy of one microgram (0.001 mg). It was developed in response to user demand, and brings all the advantages of previous micro Electrobalances to the more popular

macro range.

* * *

It is unaffected by temperature, vibration, level, humidity, and stray electrostatic and magnetic fields. It does not require a special balance table nor a special balance room, as previous fine balances did. It is exceptionally rugged and hard to damage. Hand-portable, it goes with you; you don't have to go to it. You can use it in high vacuum or high pressure, oven or cryostat, dry box or humidity chamber, and read it remotely from outside.

* * *

Further information may be obtained from the dealers, or Cahn Instrument Company, 14511 Paramount Blvd., Paramount, Calif.

New Government Directory

The General Services Administration has issued a directory entitled "Principal Officials in the Executive Branch Appointed January 20-February 20, 1961."

* * *

The 24-page booklet lists names and titles of more than 250 key officials in the White House and the various agencies appointed or retained in office by the new administration. It is a supplement to the 1960-61 edition of the U.S. Government Organization Manual.

* * *

Compiled by the Office of the Federal Register of GSA's National Archives and Records Service, the directory may be purchased for 15 cents a copy from the Superintendent of Documents, Government Printing Office, Washington, 25, D. C.

Catalog of Stock Storage Equipment

Jarke Manufacturing Co., 6322 W. Howard St., Chicago 48 (Niles), Ill., has issued a series of data sheets included in one folder, each describing a type of Modular Stock Storage Equipment for mill products.

* * *

These include mobile racks for handling, transporting and feeding strip and bar stock to machines, portable rod and strip coil racks, fixed storage racks for bar, rod and tubing, dock boards (metal), and

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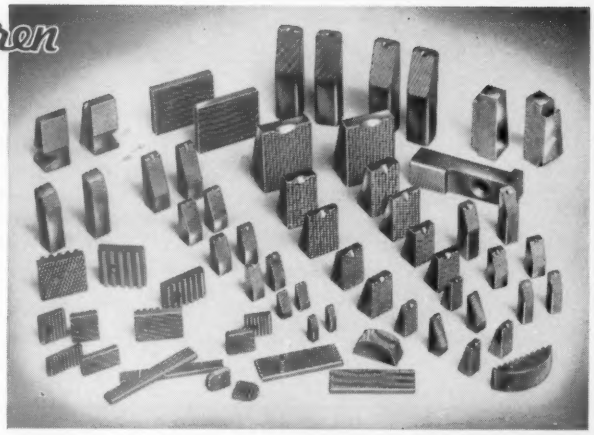

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This catalog, providing complete information on Jarke Storage and handling equipment, is available upon request to the company.

Elgin Names Western Wholesaler

The Abrasives Division of the **Elgin National Watch Company** has appointed **The Matticks Company**, 4176 East Pacific Way, Los Angeles, Calif., as the Western Wholesaler for Elgin Golden Circle Solid Carbide Tools.

* * *

Matticks will stock a complete line of carbide tools for improved delivery to the West Coast Industrial Distributors.

* * *

The Abrasives Division manufactures a complete line of solid carbide rotary tools, as well as industrial diamond products and Elgiloy, a high temperature spring alloy.

Better Stone Wire Developed

A new, faster-cutting strand for sawing stone, produced by **Bethlehem Steel Company**, cuts up to 25 per cent more stone than conventional round-wire strand.

* * *

Introduced recently, the new Bethco-Drawn strand is made with the same high-strength, high-carbon steel used for conventional round-wire strand. Results of original field tests and subsequent job applications confirm its service performance.

* * *

Most stone saws at the present time use 1/4- or 3/16-inch round two-wire strand. The limitations that accompany the use of round-wire strand, such as long break-in periods, are effectively overcome with this new product. The wires used in Bethco-Drawn strand are generally elliptical in shape, though with flattened outer surfaces. This design provides an effective bearing surface initially and continues throughout the life of the strand. Both regular and reverse lay Bethco-Drawn strand are available.

* * *

A booklet, now ready for distribution, illustrates splicing and brazing techniques with actual photographs. Accompanying the illustrations are descriptions of the procedures.

* * *

Users of steel stone-sawing strand may obtain copies of this folder, No. 739, by writing Publications Department, Bethlehem Steel Company, Bethlehem, Pa. Also available is a descriptive sheet, No. 227, on the new Bethco-Drawn strand.

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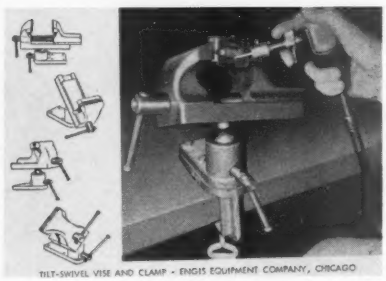
New Tilt-Swivel Vise Clamp

Engis Equipment Company has developed a new bench clamp that bolts to the Tilt-Swivel Vise and makes possible rapid mounting and change of bench location by merely loosening the clamp screw.

* * *

The ball joint of the Tilt-Swivel Vise permits swiveling through 360° and tilting to 30° up or down in any position. The clamp provides faster, easier set-up for such operations as precision filing, drilling, reaming, grinding or finishing. Work is held securely in position most convenient to operator and the entire assembly can be quickly moved from one position to another. Clamps are provided for both the large vise and the small one.



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* * *

Also available now are separate serrated tool steel jaws that can be easily interchanged with the standard unserrated jaws with which the vise is equipped.

* * *

Complete descriptive literature and price list describing the vises and the new accessories are available from **Hyprez Division,** Engis Equipment Company, 431 S. Dearborn St., Chicago 5, Ill.

Capsular Motor Insulation

The introduction of "Capsular" Insulation System for encapsulated random wound AC induction motors has recently been announced by **The Louis Allis Co.,** Milwaukee.

* * *

The new encapsulated motors offer added protection against moisture, chemicals, oils and abrasive contaminants, providing longer life for open motors used in adverse environmental atmospheres.

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Coppered Steel Spring—Galvanized—Tinned
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* * *

Write for Bulletin #3750, Louis Allis Company, Dept. P., 427 E. Stewart St., Milwaukee 1, Wisc.

New Bulletin on Catalysts

Catalytic Combustion Corporation announces the availability of Bulletin G-61 describing its all-metal gas purification catalysts and reactors.

* * *

The text describes the use of all-metal gas purification catalysts to produce industrially pure gases. Removal of impurities to less than 1 part per million can be achieved. The catalysts operate at high or low pressure, and at temperatures up to 1500°F. Unique all-metal catalyst construction prevents shifting or binding of catalyst media, provides a strong, lightweight catalyst material with exceptionally long life.

* * *

Typical applications described include:

Purification of generated atmospheres; H_2, O_2, CO, nitrogen oxides, and hydrocarbon removal from process gases, and nuclear plant recombiners.

* * *

Write for your copy of Bulletin G-61 to Catalytic Combustion Corp., 4725 Fourteenth St., Detroit 8, Mich.

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AS&W Sets up Development Division

A new division has been formed by the **American Steel & Wire Div.** of the United States Steel Corporation to study and develop new uses and markets for steel wire and wire products.

* * *

Under the management of **Robert F. Smith,** the new Product and Market Development Division, it is hoped that many new uses for wire and wire products will be developed.

* * *

Mr. Smith joined AS&W in 1946 and for the last year has been industry manager for consumer products. This new assignment greatly broadens his scope of activity.

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C.F.&I. Participates in San Francisco Project

Three products of **The Colorado Fuel and Iron Corporation's** Oakland and South San Francisco plants — high carbon wire, welded general purpose fabric, and Cal-Tie wire — are being used extensively by Herrick Iron Works of Hayward to reinforce a series of concrete water tanks on the San Francisco's East Bay area tank project.

* * *

These concrete water storage tanks range in capacity from one-half million to ten million gallons. Each storage tank is made of post-tensioned, prestressed concrete, reinforced both vertically and horizontally.

* * *

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The tanks are part of a $283 million water development project authorized in 1958 by voters in the East Bay counties. By 1967, the East Bay Municipal Utility District will be able to supply 340 million gallons of water daily to homes and industries through a vast network of reservoirs, storage tanks, dams, and 82 miles of 87 inch concrete-encased steel pipe.

New Processing-Line Uncoiler

The Steel Equipment Company, Box 737, Cleveland 22, announces a new SECO uncoiler that can provide precisely controlled tension on light-gauge slitting or processing lines. Normally, coil steel being slit into narrower coils is pulled through the slitter by the recoiler. However, with light-gauge stock, pull-through slitting can be improved. Driven slitting is then employed, but the uncoiler must supply carefully controlled back tension.

* * *

The new uncoiler features a totally enclosed, oil-tight gear drive and a drag-generator unit which maintains strip tension during slitting and also supplies power for feed up while the strip is being threaded through the slitting line. Uncoilers on pull-through lines may employ air or mechanical brakes. However, drive slitting requires extremely fine tension adjustment. The new SECO uncoiler-brake design is the perfect solution to light-gauge slitting needs.

* * *

Full details from the manufacturer upon request.

Kaiser Elects V.P. to Board

Thomas J. Ready, Jr., executive vice president of **Kaiser Aluminum & Chemical Corp.,** has been elected a member of the corporation's board of directors, **D. A. Rhoades,** president, has announced.

* * *

Mr. Ready was named executive vice president in 1959 after having served as vice president and assistant general manager. After several years with the Kaiser organization, Mr. Ready joined Kaiser Aluminum as assistant general manager when the corporation entered the aluminum industry in 1946. He was appointed a vice president in 1950. He graduated from the University of California in 1932, with a degree in economics.

G.E. Promotes Research Man

The appointment of **Dr. Thomas A. Prater** as manager of the Process Laboratories Unit of the General Electric Research Laboratory has been announced by **D. W. Lillie,** manager, Materials Application and Evaluation, Metallurgy and Ceramics Research Department. The Process Laboratories Unit provides large-scale metal processing services to aid in the transition of new materials and processes from the laboratory to full-scale commercial production. It also produces highly specialized metal articles for the Laboratory and other GE components.

* * *

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Dr. Prater is returning to the Research Laboratory from the General Engineering Laboratory, where he helped set up a program to study the application of magnetohydrodynamics — a new system of generating electric power — to large-scale power stations. He will continue to devote part of his time to this study as a consultant.

* * *

Before this assignment, Dr. Prater had been with the Research Laboratory since 1952. He has specialized in the study of alloys for high temperature applications, such as steam turbines and jet engines, and has published many papers and reports on such metals.

* * *

He first joined General Electric in 1951, as an engineer in the Metallurgical Products Department in Schenectady. Previously he had taught at Pennsylvania State University. He received his Ph.D. degree from Penn State in 1950.

Laribee Wire Names Southwest Sales Agent

Laribee Wire, Inc., Camden N.Y., has announced that its affiliated corporation, **Southwest Metal Industries, Inc.,** will act as its sales and service agents for customers in Arizona, New Mexico, Nevada and California.

Fafnir Appointments

The election of **Horace B. Van Dorn** as vice president in charge of engineering has been announced by **The Fafnir Bearing Company** of New Britain, Conn. At the same time the company announced that **Howell L. Potter** will assume Mr. Van Dorn's former post as director of engineering.

* * *

Mr. Van Dorn succeeds **Fayette Leister,** who retired December 30, as head of all Product Engineering activities. He has been with Fafnir since he graduated from Massachusetts Institute of Technology in 1937.

* * *

Ronald P. Remorenko, formerly head of the Physical Testing Laboratory, has been named Assistant Chief Research Engineer. He will assist the Chief Research Engineer, **A. Burton Jones, Jr.,** in directing the Company's research activities. Mr. Remorenko attended Massachusetts Institute of Technology where he received his Bachelor and Master of Science degrees.

Steele Appoints Representative

The M. G. Steele Company, Rome, N. Y., has announced the appointment of **John B. Clark,** Plastics **& Equipment Sales Company,** 8232 Major Ave., Morton Grove, Ill., as sales representative for its Carbon Block Brazers and Tensile Testing machines in the states of Illinois, Indiana, Michigan and Wisconsin.

* * *

Mr. Clark is well known in the local wire and plastics fields having formerly been associated with the Plastics Division of **Monsanto Chemical Company.**

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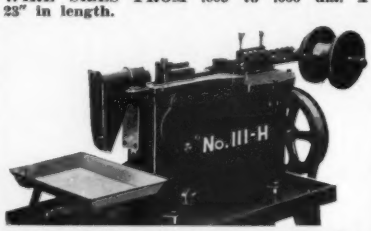

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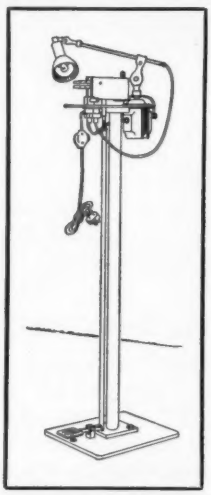

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RICHARD E. BROWN
Executive Secretary

453 MAIN STREET **STAMFORD, CONN.**

David M. Schmid to be 1961 Mordica Memorial Lecturer

An invitation to deliver the Mordica Memorial Lecture at the Annual Convention of **The Wire Association** next October has been extended to **David M. Schmid,** President of **Techalloy Company, Inc.,** Rahns, Pa.

* * *

This lecture, delivered annually by a man of outstanding achievement in the Wire Industry, is the highest honor that the Associa-

David M. Schmid

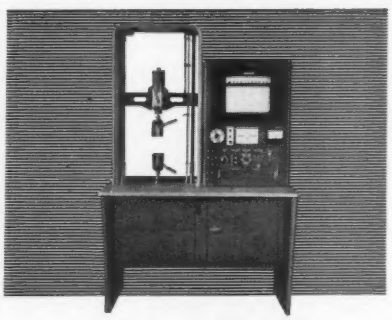
tion's Board of Directors can bestow upon an Association member. The selection of a man for this honor is made by the Board of Past Presidents.

* * *

That Mr. Schmid — Dave — will do a creditable job is a foregone conclusion. He has presented a number of Convention papers and otherwise served in official capacities on committees, and the quality of his thinking is well attested to by past performance. Mr. Schmid currently is a member of the Board of Directors.

New Anti-Static Fluid Developed

A new chemical fluid to prevent build-up of static charges on plastic-faced instruments has been developed by **Daystrom, Incorpo-**



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rated, Weston Instruments Division.

* * *

Static electricity on meter and instrument windows deflects pointers, causes faulty readings, and attracts and holds air-borne dust and dirt. The new anti-static fluid provides a thin transparent coating which drains off static electricity. The fluid is called "Statnul."

* * *

For more information on the new anti-static fluid, write: Daystrom, Incorporated, Weston Instruments Division, 614 Frelinghuysen Ave., Newark 12, N. J.

Catalog on Hose Wire

An easy-to-use catalog sheet, listing the important technical data on hose wire, has been released by **Prentiss Wire Mills,** Riverside-Alloy Metal Division, H. K. Porter Company, Inc. This Prentiss product was first introduced almost two years ago.

* * *

Testing information, especially concerning Prentiss Hose Wire's ability to adhere to rubber, is included in the illustrated catalog sheet. Mechanical properties, finish and put-up are some of the other subjects discussed in the catalog sheet.

* * *

The Prentiss plant recently expanded its facilities for the production of hose wire and has greatly increased capacity. Other wire products of the Holyoke, Mass., plant include carbon steel, stainless steel, phosphor bronze and tinned brass.

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STANDARD OIL BLDG. BALTIMORE 2, MD.

Copies of the new catalog sheet on Prentiss Hose Wire are available upon request from Publications Section, Riverside-Alloy Metal Div., H. K. Porter Co., Inc., Riverside, N. J.

Bulletin on Continuous Strip Processing

A new six-page, illustrated bulletin covers the application of vertical and horizontal equipment for processing continuous strip. Heat treatments discussed are for ferrous and also non-ferrous strip metals, and involve annealing, normalizing and galvanizing processes.

* * *

The processing of strip metal is illustrated, including mechanical handling and feeding equipment; line drive machinery; electric line drives; tension control; roll design; strip tracking, surface protection, splicing, cleaning, drying, heating and cooling. The latest generator equipment for prepared atmospheres used in the continuous processing of coiled metal is described.

* * *

Request your copy of Bulletin SC-183 by writing **Surface Combustion Division,** Midland-Ross Corporation, Toledo 1, Ohio.

Aluminum from Clay

Olin Mathieson Chemical Corporation has announced an import-

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ant breakthrough in industry's long search for a commercially practical way to make aluminum from common clay.

* * *

The corporation has developed, through the pilot plant stage, an economical process for purifying aluminum sulfate.

* * *

"With this key step, it should be possible to produce aluminum where cheap power exists, without having to compromise on plant location to suit both the raw material and the power source," according to **Dr. W. E. Hanford,** Olin's vice president for research. He announced the process at the dedication of the new Olin Research Center in New Haven, Conn., on March 20th.

* * *

The aluminum sulfate produced by Olin's acid process can be processed into alumina, the basic raw material for the manufacture of aluminum. The present source of alumina is bauxite, the supply of which within the United States is limited.

* * *

Most alumina plants have been located on deep water ports to reduce the cost of bringing in ore from the tropical "bauxite belt." The Olin acid process opens the possibility of placing a complete aluminum plant on one site where coal for electric power is cheap, since the shales associated with most coal could be an excellent source of alumina.

* * *

Olin, the nation's fourth-largest integrated aluminum producer, is a co-owner (with Revere Copper and Brass, Inc.) of the **Ormet Corporation,** which has an aluminum reduction plant at Hannibal, Ohio, in the heart of the West Virginia-Ohio coal belt. Millions of tons of alumina-containing shales are available nearby as coal mine waste, since such mines must remove shale overburdens to obtain access to coal.

* * *

The Ormet plant, third largest in the United States, currently obtains bauxite from Surinam, South America, refines it to alumina at Burnside, La., and transports the alumina up the Mississippi and Ohio Rivers to Hannibal, Ohio.

FOR SALE

30,000 lbs. Type 304, Stainless Steel Wire: — .085 — ½ Hard — 80 to 100 lbs. — 22" Bare Coils — Prime, New, Domestic Material — Surplus. Very attractively priced for immediate sale.

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WHERE TO BUY

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ABRASIVES—
Alabama Wire Die Co., Fayette, Ala.
Elgin National Watch Co., Abrasives Div., Elgin, Ill.
Hyprez Div., Engis Equipment Co., Chicago, Ill.
Indiana Wire Die Co., Ft. Wayne, Ind.
Pangborn Corporation, Hagerstown, Md.
Wheelabrator Corporation, Mishawaka, Ind.

ABRASIVES— Shot & Grit, For Cleaning
Pangborn Corporation, Hagerstown, Md.
Wheelabrator Corporation, Mishawaka, Ind.

ACID INHIBITORS—
(See Inhibitors, Pickling)

ANNEALING MACHINES — Electric Resistance
Syncro Machine Co., Perth Amboy, N. J.

ANNEALING POTS AND BOXES—
Scudder, E. J., Fdry. & Mach. Co., Trenton, N. J.

BAKERS—
(See OVENS—Rod Bakers)

BAR—Steel
Eaton Mfg. Co., Massillon, Ohio

BOBBINS—Braider & Wire Weaving
Acrometal Products, Inc., Minneapolis, Minn.
Apco Mossberg Co., Attleboro, Mass.
Mossberg Pressed Steel Corp., Division of Wanskuck Co., Attleboro, Mass.
Plastic Mold & Engineering Co., Providence, R. I.
Standard Mill Supply Co., Pawtucket, R. I.
Wardwell Braiding Machine Co., Central Falls, R. I.
Western Wire & Textile Machinery, Inc., So. San Francisco, Calif.

BORAX—Wire Drawing
U. S. Borax, New York, N. Y.

BRAZERS—Electric for Wire
Steele Company, M. G., Rome, N. Y.

CABLE ACCESSORIES
Southwire Co., Carrollton, Ga.

CABLE—Electric
Southwire Co., Carrollton, Ga.

CABLE FILLERS—Paper
Twitchell, Inc., E. W., Philadelphia, Pa.

CAPSTANS—for Wire (also Caterpiller Types)
Bartell Machine Tool Corp., Rome, N. Y.
Colbourne Machine Company, Winsted, Conn.
Coulter & McKenzie Machine Co., Bridgeport, Conn.
Davis Electric Co., Wallingford, Conn.
Davis-Standard Div. of Franklin Research and Development Corp., Mystic, Conn.
Enjaco Corporation, Cranston, R. I.
Entwistle Manufacturing Corporation, Providence, R. I.
Federal Manufacturing Company, Wallingford, Conn.

CARRIERS—Braider, High Speed
Apco Mossberg Co., Attleboro, Mass.
Mossberg Pressed Steel Corp., Division of Wanskuck Co., Attleboro, Mass.
New England Butt Co., Division of Wanskuck Co., Providence, R. I.
Wardwell Braiding Machine Co., Central Falls, R. I.
Western Wire & Textile Machinery, Inc., So. San Francisco, Calif.

CASTINGS—Wire Mill
Scudder, E. J. Fdry. & Mach. Co., Trenton, N. J.

CEMENTS—Refractory
Amchem Products, Inc., Ambler, Pa.

CLEANERS—Metal
Apex Alkali Products Co., Phila., Pa.
Circle Chemical Co., Chicago, Ill.
Magnuson Products Corporation, Brooklyn, N. Y.
Miller, R. H., Co., Inc., Homer, N. Y.
Parkin Chemical Co., The, Pittsburgh, Pa.
Standard Industrial Compounds Co., Frankfort, Ill.

CLEANING & PICKLING EQUIP.—
Cleveland Tramrail Div., of the Cleveland Crane & Engineering Co., Wickliffe, Ohio
Morgan Construction Co., Worcester, Mass.
Wheelabrator Corporation, Mishawaka, Ind.
Wilson, Lee, Engr. Co., Cleveland, Ohio

CLOTH—WIRE, All Metals
Hudson Wire Co., Pequot Div., Norwalk, Conn.
Wickwire Bros., Cortland, N. Y.
Wisconsin Wire Works, Appleton, Wis.

COATING COMPOUNDS—
Apex Alkali Products Co., Philadelphia, Pa.
Magnuson Products Corp., Brooklyn, N. Y.
Miller, R. H., Co., Homer, N. Y.
Standard Industrial Compounds Co., Frankfort, Ill.
U. S. Borax, New York, N. Y.

COLOR CONCENTRATES—For Wire Coatings
Blane Corporation, The, Canton, Mass.

COMPOUNDS—Brazing
Steele Company, M. G., Rome, N. Y.

COMPOUNDS—Coppering
Amchem Products, Inc., Ambler, Pa.
Circle Chemical Co., Chicago, Ill.
Miller, R. H. Co., Inc., Homer, N. Y.

COMPOUNDS—Diamond (Pre-Mixed)
Alabama Wire Die Co., Fayette, Ala.
Eastern Carbide Corp., New Rochelle, N. Y.
Elgin National Watch Co., Abrasives Div., Elgin, Ill.
Hyprez Div., Engis Equipment Co., Chicago, Ill.
Indiana Wire Die Co., Ft. Wayne, Ind.
Rusch Wire Die Corp., Croton-on-Hudson, N. Y.

COMPOUNDS—Extrusion, for Wire
Amchem Products, Inc., Ambler, Pa.
Blane Corporation, The, Canton, Mass.
Circle Chemical Co., Chicago, Ill.
Monsanto Chemical Company, Plastics Division, Springfield, Mass.

COMPOUNDS—For Improving Drawing & Extrusion
Amchem Products, Inc., Ambler, Pa.
Circle Chemical Co., Chicago, Ill

COMPOUNDS—Metal Finishing
Amchem Products, Inc., Ambler, Pa.
Apex Alkali Products Co., Philadelphia, Pa.
Circle Chemical Co., Chicago, Ill.

COMPOUNDS—Phosphate Coating
Amchem Products Inc., Ambler, Pa.
Circle Chemical Co., Chicago, Ill.

COMPOUNDS—Rust Preventing
Amchem Products, Inc., Ambler, Pa.
American Lanolin Corp., Lawrence, Mass.
Apex Alkali Products Co., Philadelphia, Pa.
Circle Chemical Co., Chicago, Ill.

COMPOUNDS—Rust Removing
Amchem Products, Inc., Ambler, Pa.
Apex Alkali Products Co., Philadelphia, Pa.
Magnuson Products Corp., Brooklyn, N. Y.
Standard Industrial Compounds Co., Frankfort, Ill.

COMPOUNDS—Vinyl
Blane Corporation, The, Canton, Mass.
Kenrich Petrochemicals, Inc., Maspeth, N. Y.
Monsanto Chemical Company, Plastics Division, Springfield, Mass.
Union Carbide Plastics Company, Div. of Union Carbide Corporation, New York, N. Y.

COMPOUNDS—Wire Drawing
Apex Alkali Products Co., Philadelphia, Pa.
Magnuson Products Corp., Brooklyn, N. Y.
Miller, R. H. Co., Inc., Homer, N. Y.
Standard Industrial Compounds Co., Frankfort, Ill.
Swift & Company, Chicago, Ill.
U. S. Borax, New York, N. Y.

CONDUCTORS—Flexible, Electrical
Hudson Wire Co., Ossining, N. Y.
Montgomery Co., The, Windsor Locks, Conn.

CONTAINERS—Wire Packaging
(See DRUMS—Wire Packaging)

COPHOLDERS—Steel
Apco Mossberg Co., Attleboro, Mass.
Mossberg Pressed Steel Corp., Division of Wanskuck Co., Attleboro, Mass.
Wire & Textile Mach'y, Inc., (used), Pawtucket, R. I.

CORDS—Electrical, Tinsel Conductor
Montgomery Co., The, Windsor Locks, Conn.

COUNTERS—
(See MACHINERY—Measuring Wire and Cable)

CRANES—Wire Mill
Cleveland Tramrail Div. of the Cleveland Crane & Engineering Co., Wickliffe, Ohio
Morgan Construction Co., Worcester, Mass.

CUTTING TOOLS—Carbide
Eastern Carbide Corp., New Rochelle, N. Y.
Metallurgical Products Dept. of General Electric Co., Detroit, Mich.

CUTTING TOOLS—Wire
Manco Mfg. Co., Bradley, Ill.
Robinson, M. W. Co., Rockville, Conn.

DIAMONDS—Industrial
Alabama Wire Die Co., Fayette, Ala.
Balloffet-Vianney Wire Die Co., Inc., Guttenberg, N. J.
Indiana Wire Die Co., Ft. Wayne, Ind.
Rusch Wire Die Corp., Croton-on-Hudson, N. Y
Wayne Wire Die Co., Linden, N. J.

DIAMOND POWDERS—
Danforth Company, C.W., Youngstown, Ohio
Elgin National Watch Co., Abrasives Div., Elgin, Ill.
Fort Wayne Diamond Products, Inc., Fort Wayne, Indiana
Hoosier Wire Die, Inc., Ft. Wayne, Ind.
Hyprez Div., Engis Equipment Co., Chicago, Ill.
Kelly Wire Die Corp., New York, N. Y.
New England Wire Die Co., Worcester, Mass.
Rusch Wire Die Corp., Croton-on-Hudson, N. Y.
Wayne Wire Die Co., Linden, N. J.

DIAMOND POWDER RECLAIMING—
Alabama Wire Die Co., Fayette, Ala.
Danforth Company, C.W., Youngstown, Ohio
Elgin National Watch Co., Abrasives Div., Elgin, Ill.
Fort Wayne Diamond Products, Inc., Fort Wayne, Indiana
Hoosier Wire Die, Inc., Ft. Wayne, Ind.
Indiana Wire Die Co., Ft. Wayne, Ind.
Kelly Wire Die Corp., New York, N. Y.
Rusch Wire Die Corp., Croton-on-Hudson, N. Y.

DIAMOND TOOLS—
Wayne Wire Die Co., Linden, N. J.

DIES—Carbide, Tungsten & Tantalum
Balloffet-Vianney Wire Die Co., Inc., Guttenberg, N. J.
Boulin, Victor J., Inc., New York, N. Y.
Eastern Carbide Corp., New Rochelle, N. Y.
Kelloy Corporation, New York, N. Y.
Kelly Wire Die Corp., New York, N. Y.
Metallurgical Products Dept. of General Electric Co., Detroit, Mich.
Rusch Wire Die Corp., Croton-on-Hudson, N. Y.
Wayne Wire Die Co., Linden, N. J.

DIES—Cold Heading
Eastern Carbide Corp., New Rochelle, N. Y.
Kelloy Corporation, New York, N. Y.
Metallurgical Products Dept. of General Electric Co., Detroit, Mich.

DIES—Diamond
Alabama Wire Die Co., Fayette, Ala.
Ajax Industrial Supplies, Inc., Ft. Wayne, Ind.
Balloffet-Vianney Wire Die Co., Inc., Guttenberg, N. J.
Boulin, Victor J. Inc., New York, N. Y.
Brenon, Inc., Nixon, N. J.
Ft. Wayne Wire Die Inc., Fort Wayne, Ind.
Hoosier Wire Die, Inc., Fort Wayne, Ind.
Indiana Wire Die Co., Fort Wayne, Ind.
Kelly Wire Die Corp., New York, N. Y.
National Wire Die Co., Inc., New York, N. Y.
New England Wire Die Co., Worcester, Mass.
Roux Wire Die Works, Inc., Oriskany, N. Y.
Rusch Wire Die Corp., Croton-on-Hudson, N. Y.
Wayne Wire Die Co., Linden, N. J.

DIES DIAMOND—Controlled Drawing Angle
Hoosier Wire Die, Inc., Fort Wayne, Ind.

DIES DIAMOND—Reversible
National Wire Die Co., Inc., New York, N. Y.

DIES—Extrusion
Alabama Wire Die Co., Fayette, Ala.
Central Tool and Machine Co., Bridgeport, Conn.
Eastern Carbide Corp., New Rochelle, N. Y.
Indiana Wire Die Co., Ft. Wayne, Ind.
Kelloy Corporation, New York, N. Y.
Metallurgical Products Dept. of General Electric Co., Detroit, Mich.
Rusch Wire Die Corp., Croton-on-Hudson, N.Y.
Wayne Wire Die Co., Linden, N. J.

DIES—Eyelet
Eastern Carbide Corp., New Rochelle, N. Y.
Kelloy Corporation, New York, N. Y.

DIES—Nail, Nail Cutters, Feeder Blocks, Grippers, etc.
Pittsburgh Carbide Die Co., Monongahela, Pa.

DIES—Pointing
Fenn Manufacturing Co., Newington, Conn.
Siogren Tool & Machine Co., Auburn, Mass.

DIES—Repairs & Re-Cutting
Ajax Industrial Supplies, Inc., Fort Wayne, Ind.
Balloffet-Vianney Wire Die Co., Inc., Guttenberg, N. J.
Boulin, Victor J., Inc., New York, N. Y.
Brenon, Inc., Nixon, N. J.
Eastern Carbide Corp., New Rochelle, N. Y.
Ft. Wayne Wire Die, Inc., Fort Wayne, Ind.
Hoosier Wire Die, Inc., Ft. Wayne, Ind.
Kelly Wire Die Corp., New York, N. Y.
Metallurgical Products Dept. of General Electric Co., Detroit, Mich.
National Wire Die Co., Inc., New York, N. Y.
New England Wire Die Co., Worcester, Mass.
Roux Wire Die Works, Inc., Oriskany, N. Y.
Rusch Wire Die Corp., Croton-on-Hudson, N. Y.
Wayne Wire Die Co., Linden, N. J.

DIES—Special Shapes, Etc.
Eastern Carbide Corp., New Rochelle, N. Y.
Kelloy Corporation, New York, N. Y.

DIES—Swaging
Fenn Manufacturing Co., Newington, Conn.
Sjogren Tool & Mach. Co., Inc., Auburn, Mass.

DIES—Tinning
Roux Wire Die Works, Inc., Oriskany, N. Y.

DIES—Tube Drawing
Balloffet-Vianney Wire Die Co., Inc., Guttenberg, N. J.
Eastern Carbide Corp., New Rochelle, N. Y.
Hoosier Wire Die, Inc., Ft. Wayne, Ind.
Kelloy Corporation, New York, N. Y.
Kelly Wire Die Corp., New York, N. Y.
Metallurgical Products Dept. of General Electric Co., Detroit, Mich.
Rusch Wire Die Corp., Croton-on-Hudson, N. Y.

DRAW BENCHES—
(See MACHINERY—Draw Benches)

DRIVES—Variable Speed
Allis Co., Louis, Milwaukee, Wisc.

DRUMS—Wire Packaging
Hubbard Spool Company, Div., Van Norman Industries, Inc., Garrett, Ind.
Jones & Laughlin Steel Corporation, Pittsburgh, Pa.

DRUMS & TRAVERSES—For Cable Reels
Hubbard Spool Company, Div., Van Norman Industries, Inc., Garrett, Ind.
Republic Steel Corp., Berger Div., Canton, Ohio

DRYING EQUIPMENT—
Carl Mayer Corp., The, Cleveland, Ohio

DUST COLLECTORS—Wet or Dry
Pangborn Corporation, Hagerstown, Md.
Wheelabrator Corporation, Mishawaka, Ind.

ENGINEERS—Consulting
Badwen, William D., Wilton, Conn.

EYELETS—Brass or Zinc
Platt Bros. & Co., The, Waterbury, Conn.

FOAM PRODUCING COMPOUNDS—
Amchem Products Inc., Ambler, Pa.
Parkin Chemical Co., The, Pittsburgh, Pa.

FURNACES—Annealing, Vacuum
American Laubscher Corporation, New York, N. Y.

FURNACES—Brazing
Ajax Electric Company, Philadelphia, Pa.

FURNACES—Galvanizing Equipment
Ofenbau Fritz, G.m.b.H. & Co., K. G., Hagen, (W. Germany)
Wilson, Lee, Engr. Co., Cleveland, Ohio

FURNACES—Heat Treating
Ajax Electric Company, Philadelphia, Pa.
Carl Mayer Corp., The, Cleveland, Ohio
Ofenbau Fritz, G.m.b.H. & Co., K. G., Hagen, (W. Germany)
Wilson Lee Engr. Co., Cleveland, Ohio

FURNACES—Pot (Oil, Gas, Electric)
Ajax Electric Company, Philadelphia, Pa.
Ofenbau Fritz, G.m.b.H. & Co., K. G., Hagen, (W. Germany)

FURNACES—Salt Bath
Ajax Electric Company, Philadelphia, Pa.

FURNACES—Strand Annealing
Ajax Electric Company, Philadelphia, Pa.
Ofenbau Fritz, G.m.b.H. & Co., K. G., Hagen, (W. Germany)

GALVANIZING EQUIPMENT—(See MACHINERY—Galvanizing Wire)

GUIDES—For Wire
Alabama Wire Die Co., Fayette, Ala.
Heany Industrial Ceramic Corp., New Haven, Conn.
Indiana Wire Die Co., Fort Wayne, Ind.

GUIDE TIPS—For Extruding Machines (See NOZZLES)

HAMMERS—Nail Heading
Pittsburgh Carbide Die Co., Monongahela, Pa.

HAMMERS—Swaging
Sjogren Tool & Machine Co., Auburn, Mass.

HOISTS—Electric Travelling
Cleveland Tramrail Div. of the Cleveland Crane & Engineering Co., Wickliffe, Ohio

INHIBITORS—Pickling
Apex Alkali Products Co., Philadelphia, Pa.
Parkin Chemical Co., The, Pittsburgh, Pa.

INKS—Printing, for Insulated Wire
Entwistle Manufacturing Corporation, Providence, R. I.
Gem Gravure Company, West Hanover, Mass.

INSULATING MATERIALS—
Blane Corporation, The, Canton, Mass.
Dow Corning Corporation, Midland, Mich.
General Electric Company, Insulating Materials Section, Schenectady, N. Y.
Kenrich Petrochemicals, Inc., Maspeth, N. Y.
Monsanto Chemical Company, Plastics Division, Springfield, Mass.

LACQUERNG SYSTEMS—See MACH.—Lacquering Electric Wire

LAME—LAHN—
Montgomery Co., The, Windsor Locks, Conn.

LUBRICANTS—For Metal Cutting, Stamping and Drawing
Apex Alkali Products Co., Philadelphia, Pa.
Miller, R. H., Co., Inc., Homer, N. Y.
Standard Industrial Compounds Co., Frankfort, Ill.

LUBRICANTS—Wire Drawing
(See Compounds—Wire Drawing)

LUBRICANTS—Wire Rope
Swift & Co., Chicago, Ill.

MACHINE CONTROLS—Electronic
Allis Co., Louis, Milwaukee, Wisc.

MACHINERY—Armoring (Cable, Wire, Hose)
Watson Machine Co., Paterson, N. J.
Western Wire & Textile Machinery, Inc., So. San Francisco, Calif.

MACHINERY—Barbed Wire
Glader Wm., Machine Works, Chicago, Ill.

MACHINERY—Blast Cleaning
Pangborn Corporation, Hagerstown, Md.
Wheelabrator Corporation, Mishawaka, Ind.

MACHINERY—Bobbin Winders
Hanson & Edwards, Ltd., Warrington, England

MACHINERY—Bolt, Rivet, Screw, etc.
National Machinery Co., Tiffin, Ohio
Straus-Artys Corp., Great Neck, N. Y.

MACHINERY—Braiding
New England Butt Co., Division of Wanskuck Co., Providence, R. I.
Wardwell Braiding Machine Co., Central Fall, R. I.
Wire & Textile Mach'y, Inc., (used), Pawtucket, R. I.

MACHINERY—Brazers for Wire
Steele Company, M. G., Rome, N. Y.

MACHINERY—Bunching
Cook Mfg. Co., The, Paterson, N. J.
Edmands Company, The, Cranston, R. I.
Hanson & Edwards, Ltd., Warrington, England
Haskell-Dawes Machine Co., Philadelphia, Pa.
Miyazaki Iron Works, Ltd., Osaka, Japan
New England Butt Co., Division of Wanskuck Co., Providence, R. I.
Niehaus K. A. Maschinenfabrik, Dusseldorf-Rath, Germany
Watson Machine Co., Paterson, N. J.
Western Wire & Textile Machinery, Inc., So. San Francisco, Calif.
Wire & Textile Mach'y, Inc., (used), Pawtucket, R. I.

MACHINERY—Cable, Electric
Cook Mfg. Co., The, Paterson, N. J.
Haskell-Dawes Machine Co., Philadelphia, Pa.
New England Butt Co., Division of Wanskuck Co., Providence, R. I.
Niehaus, K. A., Maschinenfabrik, Dusseldorf-Rath, Germany
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Capstans (See Capstans and Machinery—Winding Wire)

MACHINERY—Centerless Grinding & Polishing
American Laubscher Corp., New York, N. Y.
Loma Machine Manufacturing Co., New York, N.Y.

MACHINERY—Chain Link Fence
Norton & Co., Ltd., Sir James Farmer, Manchester, England
Steel & Wire Machinery Co., Cleveland, Ohio
Wafios Machinery Corp., Hackensack, N. J.

MACHINERY—Chain Making
Steel & Wire Machinery Co., Cleveland, Ohio
Wafios Machinery Corp., Hackensack, N. J.

MACHINERY—Closing Cable
Miyazaki Iron Works, Ltd., Osaka, Japan
Niehaus, K. A. Maschinenfabrik, Dusseldorf-Rath, Germany
Watson Machine Co., Paterson, N. J.

MACHINERY—Coiling Rod
Coulter & MacKenzie Machine Co., Bridgeport, Conn.
Vaughn Mach'y Co., Cuyahoga Falls, Ohio

MACHINERY—Cold Forging
National Machinery Co., Tiffin, Ohio
Unitech Products, Inc., Hartford, Conn.

MACHINERY—Cold Heading
National Machinery Co., Tiffin, Ohio
REM Sales Incorporated, Subsidiary of The Robert E. Morris Co., West Hartford, Conn.
Straus-Artys Corp., Great Neck, N. Y.

MACHINERY—Copper Wire Drawing
Cook Mfg. Co., The, Paterson, N. J.
Herborn Machinery Corporation, Hackensack, N. J.
Johnson Machinery Co., Elizabeth, N. J.
Morgardshammars Mek Verkstads A. B., Morgardshammar, Sweden
National Mach'y Exch., (Used), New York
Showa Machine Works, Ltd., Osaka, Japan
Steel & Wire Machinery Co., Cleveland, Ohio
Straus-Artys Corp., Great Neck, N. Y.
Syncro Machine Co., Perth Amboy, N. J.
Torrington Mfg. Co., Torrington, Conn.
Vaughn Machinery Co., Cuyahoga Falls, Ohio
Watkins & Sons, Inc., R. S., Sandy Hook, Conn.
Whitacre Corporation, Alhambra, California

MACHINERY—Covering Wire (See MACHINERY—Insulating Wire)
Eisler Engineering Company, Newark, N. J.
Lewis Machine Co., The, Cleveland, Ohio
Loma Machine Manufacturing Co., New York, N. Y.
Mettler Machine Tool, Inc., New Haven, Conn.
Wire Machinery, Inc., Chicago, Ill.

MACHINERY—Cutters, Hydraulic for Rod & Bar
Manco Mfg. Co., Bradley, Ill.

MACHINERY—Dead Block (Stationary Coiler)
Morgan Construction Co., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, Ohio
Wells Company, Frank L., Kenosha, Wisc.
Whitacre Corporation, Alhambra, California
Wire Machinery, Inc., Chicago, Ill.

MACHINERY—Descaling Rod, Dry
Coulter & McKenzie Machine Co., Bridgeport, Conn.
Fisher Associates, New York, N. Y.
Herborn Machinery Corporation, Hackensack, N. J.
Pangborn Corporation, Hagerstown, Md.
Wheelabrator Corporation, Mishawaka, Ind.
Wire Machinery, Inc., Chicago, Ill.

MACHINERY—Die Making
Alabama Wire Die Co., Fayette, Ala.
Boulin, Victor J., Inc., New York, N. Y.
Dykrex Corp., Roos Tool & Mfg. Div., Newark, N. J.
Indiana Wire Die Co., Ft. Wayne, Ind.
Metallurgical Products Dept. of General Electric Co., Detroit, Mich.
Sjogren Tool & Machine Co., Auburn, Mass.
Wayne Wire Die Co., Linden, N. J.

MACHINERY—Draw Benches
American Laubscher Corp., New York, N. Y.
Loma Machine Manufacturing Co., New York, N. Y.
Morgan Construction Co., Worcester, Mass.
Vaughn Mach'y Co., Cuyahoga Falls, Ohio
Wire Machinery, Inc., Chicago, Ill.

MACHINERY—Edging (See MACHINERY—Tandem Rolling and Edging Mills)

MACHINERY—Enameling
Acrometal Products, Inc., Minneapolis, Minn.
American Insulating Mach'y Co., Phila., Pa.
Cook Mfg. Co., The, Paterson, N. J.
Litzler Co., C. A., Cleveland, Ohio

MACHINERY—Extruding
Davis-Standard Division of Franklin Research and Development Corporation, Mystic, Conn.
Johnson Machinery Co., Elizabeth, N. J.
Royle, John, & Sons, Paterson, N. J.
Western Wire & Textile Machinery, Inc., So. San Francisco, Calif.

MACHINERY—Fence
Glader, Wm., Machine Works, Chicago, Ill.
Norton & Co., Ltd., Sir James Farmer, Manchester, England
Wafios Machinery Corp., Hackensack, N. J.

MACHINERY—Flat Wire
Fenn Manufacturing Co., Newington, Conn.
Herborn Machinery Corporation, Hackensack, N. J.
Mettler Machine Tool, Inc., New Haven, Conn.
Stanat Mfg. Co., Inc., Westbury, L. I., N. Y.
Steel Equipment Company, Cleveland, Ohio
Steel & Wire Machinery Co., Cleveland, Ohio
Torrington Mfg. Co., Torrington, Conn.
Watkins & Sons, Inc., R. S., Sandy Hook, Conn.

MACHINERY—Forming Wire
National Mach'y Exch., (Used), New York, N. Y.
Steel & Wire Machinery Co., Cleveland, Ohio
Straus-Artys Corp., Great Neck, N. Y.
Wafios Machinery Corp., Hackensack, N. J.

MACHINERY—Galvanizing Wire
Miyazaki Iron Works, Ltd., Osaka, Japan
Ofenbau Fritz G.m.b.H. & Co., K. G., Hagen, (W.-Germany)
Steel & Wire Machinery Co., Cleveland, Ohio
Vaughn Mach'y Co., Cuyahoga Falls, Ohio
Whitacre Corporation, Alhambra, California
Wilson, Lee, Engr. Co., Cleveland, Ohio

MACHINERY—Gang Winders
Entwistle Manufacturing Corporation, Providence, R. I.

MACHINERY—Insulating Wire
American Insulating Mach'y. Co., Phila., Pa.
Davis Electric Co., Wallingford, Conn.
Davis-Standard Division of Franklin Research and Development Corporation, Mystic, Conn.
Litzler Co., C. A., Cleveland, Ohio
Niehaus, K. A., Maschinenfabrik, Dusseldorf-Rath, Germany
Pourtier Pere et Fils, Romainville (Seine), France
Royle, John & Sons, Paterson, N. J.
Wardwell Braiding Machine Co., Central Falls, R. I.

MACHINERY—Insulation Testing (See MACHINERY—Spark Testing)

MACHINERY—Lacquering Electric Wire
Cook Mfg. Co., The, Paterson, N. J.
Litzler Co., C. A., Cleveland, Ohio

MACHINERY—Lock Washer
Wafios Machinery Corp., Hackensack, N. J.

MACHINERY—Looms, Wire Weaving
EVG., Machinen & Stahl, A. G., Zurich, Switzerland

MACHINERY—Material Handling
(See Material Handling Equipment)

MACHINERY—Measuring Wire & Cable
Davis Electric Co., Wallingford, Conn.
Durant Mfg. Co., Milwaukee, Wisc.
Enjaco Corporation, Cranston, R. I.
Entwistle Manufacturing Corporation, Providence, R. I.
Federal Manufacturing Company, Wallingford, Conn.
New England Butt Co., Division Wanskuck Co., Providence, R. I.
Standard Mill Supply Co., Pawtucket, R. I.

MACHINERY—Measuring and Control—Coating
Davis-Standard Div. of Franklin Research and Development Corp., Mystic, Conn.

MACHINERY—Nail and Tack
Glader, Wm., Machine Works, Chicago, Ill.
National Machinery Co., Tiffin, Ohio
National Mach'y Exch. (Used), N.Y., N.Y.
Wafios Machinery Corp., Hackensack, N. J.

MACHINERY—Packaging Wire
Coulter & McKenzie Machine Co., Bridgeport, Conn.
Vaughn Machinery Co., Cuyahoga Falls, Ohio
Whitacre Corporation, Alhambra, California

MACHINERY—Patenting Wire
Ofenbau Fritz G.m.b.H. & Co., K. G., Hagen, (W.-Germany)
Vaughn Machinery Co., Cuyahoga Falls, Ohio
Whitacre Corporation, Alhambra, California

MACHINERY—Pin
REM Sales Incorporated, Subsidiary of The Robert E. Morris Company, West Hartford, Conn.

MACHINERY—Plating
Bartell Machine Tool Corp., Rome, N. Y.
Universal Industrial Equipment Co., Secaucus, N. J.

MACHINERY—Pointing
Herborn Machinery Corporation, Hackensack, N. J.
Morgan Construction Co., Worcester, Mass.
National Mach'y Exch., (Used), New York, N. Y.
Scudder, E. J., Fdry. & Mach. Co., Trenton, N. J.
Straus-Artys Corp., Great Neck, N. Y.
Syncro Machine Co., Perth Amboy, N. J.
Vaughn Mach'y Co., Cuyahoga Falls, Ohio

MACHINERY—Printing on Electric Wire
Enjaco Corporation, Cranston, R. I.
Entwistle Manufacturing Corporation, Providence, R. I.
Gem Gravure Co., West Hanover, Mass.
Gillies, Duncan M., Co., Inc., West Boylston, Mass.

MACHINERY—Re-Spooling
Acrometal Products, Inc., Minneapolis, Minn.
Bartell Machine Tool Corp., Rome, N. Y.
Coulter & McKenzie Machine Co., Bridgeport, Conn.
Davis Electric Co., Wallingford, Conn.
Emory Company, Robert J., Newark, N. J.
Enjaco Corporation, Cranston, R. I.
Entwistle Manufacturing Corporation, Providence, R. I.
Federal Manufacturing Company, Wallingford, Conn.
Herborn Machinery Corporation, Hackensack, N. J.
Miyazaki Iron Works, Ltd., Osaka, Japan
National Mach'y Exch. (Used), New York, N. Y.
Western Wire & Textile Machinery, Inc., So. San Francisco, Calif.
Wire & Textile Mach'y Inc., (used), Pawtucket, R. I.

MACHINERY—Rod Mill
Herborn Machinery Corporation, Hackensack, N. J.
Morgan Construction Co., Worcester, Mass.

MACHINERY—Rolling Mill
Fenn Manufacturing Co., Newington, Conn.
Loma Machine Manufacturing Co., New York, N. Y.
Morgan Construction Co., Worcester, Mass.
Stanat Mfg. Co., Inc., Westbury, L. I., N. Y.
Watkins & Sons, Inc., R. S., Sandy Hook, Conn.

MACHINERY—Rubber Insulating
Davis-Standard Division of Franklin Research and Development Corporation, Mystic, Conn.
Litzler Co., C. A., Cleveland, Ohio.
Royle, John & Sons, Paterson, N. J.
Western Wire & Textile Machinery, Inc., So. San Francisco, Calif.
Wire & Textile Mach'y Inc., (used), Pawtucket, R. I.

MACHINERY—Serving
Pourtier Pere et Fils, Romainville (Seine), France
Wardwell Braiding Machine Co., Central Falls, R. I.

MACHINERY—Slitting Mills
Stanat Mfg. Co., Inc., Westbury, L. I., N. Y.
Steel Equipment Company, Cleveland, Ohio

MACHINERY—Special
Stanat Mfg. Co., Inc., Westbury, L. I., N. Y.
Watkins & Sons, Inc., R. S., Sandy Hook, Conn.

MACHINERY—Spring Making
National Mach'y Exch., (Used), New York, N. Y.
Torrington Mfg. Co., Torrington, Conn.
Wafios Machinery Corp., Hackensack, N. J.
Wells Company, Frank L., Kenosha, Wisc.

MACHINERY—Straightening & Cutting
American Laubscher Corp., New York, N. Y.
Johnson Machinery Co., Elizabeth, N. J.
Lewis Machine Co., The, Cleveland, Ohio
Loma Machine Manufacturing Co., New York, N. Y.
Mettler Machine Tool Co., New Haven, Conn.
National Mach'y Exch. (Used), New York, N.Y.
Patterson, George C., Machine Co., Cleveland, Ohio
Steel & Wire Machinery Co., Cleveland, Ohio
Vaughn Machinery Co., Cuyahoga Falls, Ohio
Wafios Machinery Corp., Hackensack, N. J.
Wells Company, Frank L., Kenosha, Wisc.

MACHINERY—Stranding
Bartell Machine Tool Corp., Rome, N. Y.
Hanson & Edwards, Ltd., Warrington, England
Haskell-Dawes Machine Co., Phila., Pa.
Johnson Machinery Co., Elizabeth, N. J.
Miyazaki Iron Works, Ltd., Osaka, Japan
New England Butt Co., Division Wanskuck Co., Providence, R. I.
Niehaus, K. A., Maschinenfabrik, Dusseldorf-Rath, Germany
Stanat Mfg. Co., Inc., Westbury, L. I., N. Y.
Superior Tool & Manufacturing Company, Worcester, Mass.
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Swaging
Fenn Manufacturing Co., Newington, Conn.

MACHINERY—Tandem Rolling & Edging Mills
Fenn Manufacturing Co., Newington, Conn.
Loma Machine Manufacturing Co., New York, N. Y.
Stanat Mfg. Co., Inc., Westbury, L. I., N. Y.

MACHINERY—Take-Up and Pay-Out
Acrometal Products, Inc., Minneapolis, Minn.
American Insulating Mach'y Co., Phila., Pa.
Bartell Machine Tool Corp., Rome, N. Y.
Colbourne Machine Company, Winsted, Conn.
Coulter & McKenzie Machine Co., Bridgeport, Conn.
Davis Electric Co., Wallingford, Conn.
Davis-Standard Division of Franklin Research and Development Corporation, Mystic, Conn.
Enjaco Corporation, Cranston, R. I.
Entwistle Manufacturing Corporation, Providence, R. I.
Federal Manufacturing Company, Wallingford, Conn.
Fenn Manufacturing Co., Newington, Conn.
Johnson Machinery Co., Elizabeth, N. J.
Litzler Co., C. A., Cleveland, Ohio.
Miyazaki Iron Works, Ltd., Osaka, Japan
Niehaus, K. A., Maschinenfabrik, Dusseldorf-Rath, Germany
Pourtier Pere et Fils, Romainville (Seine) France
Stanat Mfg. Co., Inc., Westbury, L. I., N. Y.
Standard Mill Supply Co., Pawtucket, R. I.
Steel Equipment Company, Cleveland, Ohio
Vaughn Machinery Co., Cuyahoga Falls, Ohio
Wardwell Braiding Machine Co., Central Falls, R. I.
Watson Machine Co., Paterson, N. J.
Whitacre Corporation, Alhambra, California

MACHINERY—Taping
American Insulating Mach'y Co., Phila., Pa.
New England Butt Co., Division Wanskuck Co., Providence, R. I.
Niehaus, K. A., Maschinenfabrik, Dusseldorf-Rath, Germany
Pourtier Pere et Fils, Romainville (Seine) France
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Thread Rolling
Mettler Machine Tool, Inc., New Haven, Conn.
Straus-Artys Corp., Great Neck, N. Y.
Wire Machinery, Inc., Chicago, Ill.

MACHINERY—Tinning Wire
American Insuating Mach'y Co., Phila., Pa.
Cook Mfg. Co., The, Paterson, N. J.
Litzler Co., C. A., Cleveland, Ohio

Ofenbau Fritz G.m.b.H. & Co. K. G., Hagen, (W.-Germany)
Universal Industrial Equipment Co., Secaucus, N. J.
Whitacre Corporation, Alhambra, California

MACHINERY—Tinsel Rolling Mills
American Insulating Mach'y Co., Phila., Pa.

MACHINERY—Trolley Wire
Torrington Mfg. Co., Torrington, Conn.
Vaughn Machinery Co., Cuyahoga Falls, Ohio

MACHINERY—Tube Mill, Cold Drawing
Johnson Machinery Co., Elizabeth, N. J.
Loma Machine Manufacturing Co., New York, N. Y.
Mettler Machine Tool, Inc., New Haven, Conn.

MACHINERY—Twinning
(See Mach.—Bunching)

MACHINERY—Twisters, Wire
Cook Manufacturing Co., The, Paterson, N.J.
Edmands Company, The, Cranston, R. I.
Haskell-Dawes Machine Co., Philadelphia, Pa.

MACHINERY—Used
Johnson Machinery Co., Elizabeth, N. J.
National Machinery Exchange, New York, N. Y.
Wire & Textile Machy., Inc., Pawtucket, R. I.
Wire Machinery, Inc., Chicago, Ill.

MACHINERY—Variable Speed Drives
Allis Co., Louis, Milwaukee, Wisc.

MACHINERY—Welded Wire Mesh
EVG, Maschinen and Stahl, A.G., Zurich, Switzerland
Sommer Products Company, Peoria, Ill.

MACHINERY—for Wire Welding
(See WELDERS—Butt and Spot and Machinery—Welding Wire Fabrics)

MACHINERY—Winding Wire
Davis Electric Co., Wallingford, Conn.
Davis-Standard Div. of Franklin Research and Development Corp., Mystic, Conn.
Emory Company, Robert J., Newark, N. J.
Enjaco Corporation, Cranston, R. I.
Federal Manufacturing Company, Wallingford, Conn.
Miyazaki Iron Works, Ltd., Osaka, Japan
New England Butt Co., Division Wanskuck Co., Providence, R. I.
Niehaus, K. A., Maschinenfabrik, Dusseldorf-Rath, Germany
Standard Mill Supply Co., Pawtucket, R. I.
Steel Equipment Company, Cleveland, Ohio
Straus-Artys Corp., Great Neck, N. Y.

MACHINERY—Wire Drawing
American Laubscher Corporation, New York, N. Y.
Cook Manufacturing Co., The, Paterson, N.J.
Coulter & McKenzie Machine Co., Bridgeport, Conn.
Fenn Manufacturing Co., Newington, Conn.
Herborn Machinery Corporation, Hackensack, N. J.
Johnson Machinery Co., Elizabeth, N. J.
Loma Machine Manufacturing Co., New York, N. Y.
Miyazaki Iron Works, Ltd., Osaka, Japan
Morgan Construction Co., Worcester, Mass.
Morgardshammars Mek Verkstads AB, Morgardshammar, Sweden
National Mach'y Exch. (Used), New York, N. Y.
Norton & Co., Ltd., Sir James Farmer, Manchester, England
Scudder, E. J., Fdry. & Mach. Co., Trenton, N. J.
Showa Machine Works Ltd., Osaka, Japan
Societa Generale Delle Macchine Mill, Milan, Italy
Stanat Mfg. Co., Inc., Westbury, L. I., N. Y.
Steel Wire and Machinery Co., Cleveland, Ohio
Straus-Artys Corp., Great Neck, N. Y.
Superior Tool & Machinery Company, Worcester, Mass.
Syncro Machine Co., Perth Amboy, N. J.
Vaughn Mach'y Co., Cuyahoga Falls, Ohio
Wartenweiler, Emilio, Milano, Italy—SAMP
Watkins & Sons, Inc., R. S., Sandy Hook, Conn.
Whitacre Corporation, Alhambra, California
Wire Machinery Inc., Chicago, Ill.

MACHINERY—Wire Rope
Niehaus, K. A., Maschinenfabrik, Dusseldorf-Rath, Germany
Watson Machine Co., Paterson, N. J.

MACHINERY—Wrapping with Paper
American Laubscher Corp, New York, N. Y.
Larmuth (1947) Ltd., Cheshire, England

MATERIAL HANDLING EQUIPMENT—
Cleveland Tramrail Div. of The Cleveland Crane & Engineering Co., Wickliffe, Ohio

MOTORS—Electric
Allis Co., Louis, Milwaukee, Wisc.

NAIL TOOLING—Tungsten Carbide
Pittsburgh Carbide Die Co., Monongahela, Pa.

NAILS—Wire
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Ind.
Keystone Steel & Wire Co., Peoria, Ill.
Wickwire Brothers, Inc., Cortland, N. Y.

NIPPERS—Wire Cutting
Robinson, M. W. Co., Rockfall, Conn.

NOZZLES—For Extruding Machines
Central Tool and Mach. Co., Bridgeport, Conn.

OVENS—Cable Lacquering and Enameling
American Insulating Mach'y Co., Phila., Pa.
Carl Mayer Corp., The, Cleveland, Ohio
Colbourne Machine Co., Winsted, Conn.

OVENS—Rod Bakers
Carl Mayer Corp., The, Cleveland, Ohio

OVENS—Welding Rod Coating
Carl Mayer Corp., The, Cleveland, Ohio

PAILS—Packaging
(See Drums—Wire Packaging)

PAPER—Insulating
Twitchell, Inc., E. W., Philadelphia, Pa.

PAY-OUT SYSTEMS—
(See MACHINERY—Take-Up & Pay-Out)

PHOSPHATE COATING CHEMICALS
(See COMPOUNDS—Phosphate Coating)

PICKLING COMPOUNDS—
See (Inhibitors—Pickling)

PLASTICIZERS—
Kenrich Petrochemicals, Inc., Maspeth, N. Y.
Monsanto Chemical Company, Plastics Division, Springfield, Mass.

PLASTICS—for Wire Insulation
Blane Corporation, The, Canton, Mass.
Dow Corning Corporation, Midland, Mich.
Kenrich Petrochemicals, Inc., Maspeth, N. Y.
Monsanto Chemical Company, Plastics Division, Springfield, Mass.
Union Carbide Plastics Company, Div. of Union Carbide Corporation, New York, N. Y.
Union Carbide Corporation, Silicones Division, New York, N. Y.

PRINTING WHEELS—for Electric Wire
Daniels & Co., Frank, New York, N. Y.
Entwistle Manufacturing Corporation, Providence, R. I.
Gem Gravure Co., Inc., West Hanover, Mass.
Gillies, Duncan M., Co., Inc., West Boylston, Mass.

PULLERS AND GRIPS—for Wire
Morgan Construction Co., Worcester, Mass.
Scudder, E. J. Fdry. & Mach. Co., Trenton, N. J.
Sjogren Tool & Mach. Co., Auburn, Mass.

RACKS—Wire Storage
Jarke Manufacturing Co., Chicago, Illinois

REEL AND TENSION STANDS—
Acrometal Products, Inc., Minneapolis, Minn.
Mettler Machine Tool, Inc., New Haven, Conn.
Northern Indiana Steel Supply Co., Michigan City, Ind.
Standard Mill Supply Co., Pawtucket, R. I.
Wardwell Braiding Machine Co., Central Falls, R. I.

REELS & SPOOLS—Aluminum Alloy
Acrometal Products, Inc., Minneapolis, Minn.
Hubbard Spool Company Div., Van Norman Industries, Inc., Garrett, Ind.
Wardwell Braiding Machine Co., Central Falls, R. I.

REELS & SPOOLS—Annealing and Stranding
Acrometal Products, Inc., Minneapolis, Minn.
Apco Mossberg Co., Attleboro, Mass.
Hubbard Spool Company Div., Van Norman Industries, Inc., Garrett, Ind.
Mossberg Pressed Steel Corp., Division of Wanskuck Co., Attleboro, Mass.
Republic Steel Corp., Berger Div., Canton, Ohio

REELS—Metal Bound
Durkee Mfg. Co., Inc., Pine River, Minn.
Hubbard Spool Company Div., Van Norman Industries, Inc., Garrett, Ind.

REELS—Plywood
Hubbard Spool Company Div., Van Norman Industries, Inc., Garrett, Ind.

REELS & SPOOLS—Steel (All Types)
Acrometal Products, Inc., Minneapolis, Minn.
Apco Mossberg Co., Attleboro, Mass.
Clark Manufacturing Co., J. L., Rockford, Illinois
Hubbard Spool Company Div., Van Norman Industries, Inc., Garrett, Ind.
Mossberg Pressed Steel Corp., Division of Wanskuck Co., Attleboro, Mass.
Northern Indiana Steel Supply Co., Michigan City, Ind.
Republic Steel Corp., Berger Div., Canton, Ohio
Wardwell Braiding Machine Co., Central Falls, R. I.

REELS—Wire Mill
Acrometal Products, Inc., Minneapolis, Minn.
Apco Mossberg Co., Attleboro, Mass.
Bridge Mfg. Co., The, Hazardville, Conn.
Durkee Mfg. Co. Inc., Pine River, Minn.
Hubbard Spool Company Div., Van Norman Industries, Inc., Garrett, Ind.
Mossberg Pressed Steel Corp., Division of Wanskuck Co., Attleboro, Mass.
Nelson Co., The, Baltimore, Md.
Northern Indiana Steel Supply Co., Michigan City, Ind.
Republic Steel Corp., Berger Div., Canton, Ohio
Wardwell Braiding Machine Co., Central Falls, R. I.

REELS & SPOOLS—Wood
American Wood Working Co., Montello, Wisc.
Bridge Mfg. Co., The, Hazardville, Conn.
Durkee Mfg. Co., Inc., Pine River, Minn.
Hubbard Spool Company Div., Van Norman Industries, Inc., Garrett, Ind.
Nelson Co., The, Baltimore, Md.

ROD BAKERS—
(See OVENS—Rod Bakers)

RODS—Stainless Steel
American Steel & Wire Div., United States Steel Corp., Cleveland, Ohio

RODS—Wire—Non-Ferrous
Platt Bros. & Co., The, Waterbury, Conn.

RODS—Steel
American Steel & Wire Div., United States Steel Corp., Cleveland, Ohio
Bethlehem Steel Co., Bethlehem, Pa.
Colorado Fuel and Iron Corporation, Denver, Oakland & New York City.
Continental Steel Corp., Kokomo, Ind.
Detroit Steel Corporation, Detroit, Mich.
Eaton Mfg. Co., Massillon, Ohio
Keystone Steel & Wire Co., Peoria, Ill.
Niederrheinische Huette, A. G., Duisburg, Germany
Sumitomo Metal Industries, Ltd., Osaka, Japan
Wickwire Spencer Steel Div., Colorado Fuel & Iron Corp., New York, N. Y.
Yawata Iron & Steel Co., Ltd., Tokyo, Japan

ROPE—Wire
American Chain & Cable Co., Page Steel & Wire Div., Monessen, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Roebling's, John A. Sons, Div., Colorado Fuel & Iron Corp., Trenton, N. J.

RUST PROOF COMPOUNDS—
(See COMPOUNDS—RUST Removing)

RUST REMOVING COMPOUNDS—
(See COMPOUNDS—RUST Preventing)

SCRAP WIRE—Bare or Insulated, Bought
Electro Metals Separation Co. Div. of M. J. Stavola & Co., Inc., Danbury, Conn.

SILICONE RUBBER—For Wire Insulation
Dow Corning Corporation, Midland, Mich.

SOAPS—Industrial and Wire Drawing
(See COMPOUNDS—Wire Drawing)

SPOOLS—For Retail Sale of Wire
American Wood Working Co., Montello, Wisc.
Clark Manufacturing Co., J. L., Rockford, Illinois

SPOOLS—Plastic
Hubbard Spool Company Div., Van Norman Industries, Inc., Garrett, Ind.
Plastic Mold & Eng. Co., Providence, R. I.
Standard Mill Supply Co., Pawtucket, R. I.

STAMPINGS—Steel
Mossberg Pressed Steel Corp., Division of Wanskuck Co., Attleboro, Mass.

STOCK STORAGE SYSTEMS—
Jarke Manufacturing Co., Chicago, Illinois

STRAND—Galvanized Steel
Southwire Co., Carrollton, Ga.

STRIP—Steel
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Ind.
Jones & Laughlin Steel Corporation, Pittsburgh, Pa.
Roebling's, John A. Sons Div., Colorado Fuel & Iron Corp., Trenton, N. J.

TANKS—Ceramic, for Galvanizing
Ofenbau Fritz G.m.b.H. & Co. K. G., Hagen, (W.-Germany)

TENSION METERS—for Wire
Boulin Instrument Corp., Pelham, N. Y.
Tensitron, Inc., Harvard, Mass.

TESTERS—INSULATION
(See Testing Equipment—for Dielectric Faults)

TESTING EQUIPMENT—Dielectric Faults in Insulation
Davis Electric Co., Wallingford, Conn.
Enjaco Corporation, Cranston, R. I.
Entwistle Manufacturing Corporation, Providence, R. I.
Federal Manufacturing Company, Wallingford, Conn.
Peschel Electronics, Inc., Patterson, N. Y.

TESTING EQUIPMENT—Physical
Scott Testers, Inc., Providence, R. I.
Steele Company, M. G., Rome, N. Y.

TINSEL—Electric Conductor
Montgomery Co., The, Windsor Locks, Conn.

TINSEL WIRE—Resistance, Lame, Decorative Cords Thread—Bare Copper Silver and False Gold Coated, etc.
(See TINSEL-Electric Conductor)

TOOLS—Nail Machine
Pittsburgh Carbide Die Co., Monongahela, Pa.

TRAMRAIL SYSTEMS—
Cleveland Tramrail Div. of the Cleveland Crane & Engineering Co., Wickliffe, Ohio

TRANSMISSIONS—Variable Speed (See Adjustable Speed Drives)

TRAVERSE & DRUMS—For Reels
(See Drums & Traverses)

TRAVERSE MECHANISMS—
Davis Electric Co., Wallingford, Conn.
Emory Company, Robert J., Newark, N. J.
Western Wire & Textile Machinery, Inc., So. San Francisco, Calif.

VARNISHES & LACQUERS—for Electric Wire
General Electric Company, Insulating Materials Section, Schenectady, N. Y.

VULCANIZING PANS AND EQUIPMENT—
American Insulating Mach'y Co., Phila., Pa.
Mossberg Pressed Steel Corp., Division of Wanskuck Co., Attleboro, Mass.

WELDERS—Spot and Butt and Welding Wire Fabrics
Eisler Engineering Corp., Newark, N. J.
EVG, Maschinen and Stahl, A.G., Zurich, Switzerland
Herborn Machinery Corporation, Hackensack, N. J.
Micro Products Co., Chicago, Ill.
Sommers Products Company, Peoria, Ill.

WHEELS—for Printing on Electric Wire
Daniels & Co., Frank, New York, N. Y.
Gem Gravure Company, West Hanover, Mass.
Gillies, Duncan M., Co., Inc., West Boylston, Mass.

WIRE—ACSR
Southwire Co., Carrollton, Ga.

WIRE—Aluminum
Hudson Wire Co., Ossining, N. Y.
Malin & Co., The, Cleveland, Ohio
Southwire Co., Carrollton, Ga.

WIRE—Ball
Webb Wire Div. Carpenter Steel Co., New Brunswick, N. J.

WIRE—Ball & Roller Bearing
Eaton Mfg. Co., Massillon, Ohio

WIRE—Barbed
Jones & Laughlin Steel Corporation, Pittsburgh, Pa.

WIRE—Brake Lining
Hudson Wire Co., Ossining, N. Y.

WIRE—Brass and Bronze
Malin & Co., The, Cleveland, Ohio
Wisconsin Wire Works, Appleton, Wis.

WIRE—Brush
Hudson Wire Co., Ossining, N. Y.
Maryland Fine & Specialty Wire Co., Inc., Cockeysville, Md.

WIRE—Building, Electric
Southwire Co., Carrollton, Ga.

WIRE—Bunched and Stranded
Camden Wire Co., Camden, N. Y.
Laribee Wire, Inc., Camden, N. Y.

WIRE—Cadmium
Stamford Processing Co., Peekskill, N. Y.

WIRE—Cold Heading
American Steel & Wire Div., United States Steel Corp., Cleveland, Ohio
Bethlehem Steel Co., Bethlehem, Pa.
Colorado Fuel and Iron Corporation, Denver, Oakland & New York City.
Continental Steel Corp., Kokomo, Ind.
Detroit Steel Corporation, Detroit, Mich.
Jones & Laughlin Steel Corporation, Pittsburgh, Pa.
Jones & Laughlin Steel Corp., Stainless and Strip Div., Detroit, Mich.
Keystone Steel & Wire Co., Peoria, Ill.
Maryland Fine & Specialty Wire Co., Inc., Cockeysville, Md.
Pittsburgh Steel Co., Pittsburgh, Pa.
Wickwire Spencer Steel Div., The Colorado Fuel & Iron Corp., New York, N. Y.

WIRE—Copper
Camden Wire Co., Camden, N. Y.
Hudson Wire Co., Ossining, N. Y.
Laribee Wire, Inc., Camden, N. Y.
Malin & Co., The, Cleveland, Ohio
Southwire Co., Carrollton, Ga.

WIRE—For Electrical Conductors
Camden Wire Co., Camden, N. Y.
Laribee Wire, Inc., Camden, N. Y.

WIRE—Flat
American Chain & Cable Co., Page Steel & Wire Div., Monessen, Pa.
Colorado Fuel and Iron Corporation, Denver, Oakland & New York City.
Jones & Laughlin Steel Corp., Stainless and Strip Div., Detroit, Mich.
Montgomery Co., The, Windsor Locks, Conn.
Webb Wire Div. Carpenter Steel Co., New Brunswick, N. J.

WIRE—Galvanized
American Steel & Wire Div., United States Steel Corp., Cleveland, Ohio
Colorado Fuel and Iron Corporation, Denver, Oakland & New York City.
Detroit Steel Corporation, Detroit, Mich.
Jones & Laughlin Steel Corporation, Pittsburgh, Pa.
Roebling's, John A. Sons Div., Colorado Fuel & Iron Corp., Trenton, N. J.
Wickwire Spencer Steel Div., Colorado Fuel & Iron Corp., New York, N. Y.

WIRE—High Carbon
American Chain & Cable Co., Page Steel & Wire Div., Monessen, Pa.
Detroit Steel Corporation, Detroit, Mich.
Maryland Fine & Specialty Wire Co., Inc., Cockeysville, Md.
Webb Wire Div., Carpenter Steel Co., New Brunswick, N. J.

WIRE—Insulated
Southwire Co., Carrollton, Ga.

WIRE—Manufacturers
American Chain & Cable Co., Page Steel & Wire Div., Monessen, Pa.
American Steel & Wire Div., United States Steel Corp., Cleveland, Ohio
Bethlehem Steel Co., Bethlehem, Pa.
Colorado Fuel and Iron Corporation, Denver, Oakland & New York City.
Continental Steel Corp., Kokomo, Ind.
Detroit Steel Corporation, Detroit, Mich.
Jones & Laughlin Steel Corporation, Pittsburgh, Pa.
Jones & Laughlin Steel Corp., Stainless and Strip Div., Detroit, Mich.
Keystone Steel & Wire Co., Peoria, Ill.
Maryland Fine & Specialty Wire Co., Inc., Cockeysville, Md.
Pittsburgh Steel Co., Pittsburgh, Pa.
Republic Steel Corp., Berger Div., Canton, Ohio
Roebling's, John A., Sons Div., Colorado Fuel & Iron Corp., Trenton, N. J.
Rylands Brothers Limited, Warrington, England
U. S. Steel Corp., N. Y., N. Y.
Webb Wire Div., Carpenter Steel Co., New Brunswick, N. J.
Wickwire Brothers, Inc., Cortland, N. Y.
Wickwire Spencer Steel Div., The Colorado Fuel & Iron Corp., New York, N. Y.

WIRE—Metalizing
American Chain & Cable Co., Page Steel & Wire Div., Monessen, Pa.
Hudson Wire Co., Ossining, N. Y.
Platt Bros. & Co., The, Waterbury, Conn.
Stamford Processing Co., Peekskill, N. Y.

WIRE—Music
Malin & Co., The, Cleveland, Ohio

WIRE—Needle
Webb Wire Div., Carpenter Steel Co., New Brunswick, N. J.

WIRE—Nickel Alloy
Webb Wire Div., Carpenter Steel Co., New Brunswick, N. J.
Wisconsin Wire Works, Appleton, Wis.

WIRE—Nickel Silver and Phosphor Bronze
Malin & Co., The, Cleveland, Ohio
Wisconsin Wire Works, Appleton, Wis.

WIRE—Oil Tempered
Colorado Fuel and Iron Corporation, Denver, Oakland & New York City.
Detroit Steel Corporation, Detroit, Mich.
Jones & Laughlin Steel Corporation, Pittsburgh, Pa
Malin & Co., The, Cleveland, Ohio
Pittsburgh Steel Co., Pittsburgh, Pa.
Roebling's, John A., Sons Div., Colorado Fuel & Iron Corp., Trenton, N. J.
Wickwire Spencer Steel Div., Colorado Fuel & Iron Corp., New York, N. Y.

WIRE—for Prestressed Concrete
Rylands Brothers, Limited, Warrington, England

WIRE—Pin
Maryland Fine & Specialty Wire Co., Inc., Cockeysville, Md.

WIRE—Special Shapes
American Chain & Cable Co., Page Steel & Wire Div., Monessen, Pa.
Colorado Fuel and Iron Corporation, Denver, Oakland & New York City.
Continental Steel Corp., Kokomo, Ind.
Eaton Mfg. Co., Massillon, Ohio
Jones & Laughlin Steel Corp., Stainless and Strip Div., Detroit, Mich.
Wickwire Spencer Steel Div., The Colorado Fuel & Iron Corp., New York, N. Y.

WIRE—Spring
American Chain & Cable Co., Page Steel & Wire Div., Monessen, Pa.
American Steel & Wire Div., United States Steel Corp., Cleveland, Ohio
Bethlehem Steel Co., Bethlehem, Pa.
Colorado Fuel and Iron Corporation, Denver, Oakland & New York City.
Continental Steel Corp., Kokomo, Ind.
Jones & Laughlin Steel Corporation, Pittsburgh, Pa.
Jones & Laughlin Steel Corp., Stainless and Strip Div., Detroit, Mich.
Keystone Steel & Wire Co., Peoria, Ill.
Maryland Fine & Specialty Wire Co., Inc., Cockeysville, Md.
Pittsburgh Steel Co., Pittsburgh, Pa.
Roebling's, John A., Sons Div., Colorado Fuel & Iron Corp., Trenton, N. J.
Webb Wire Div., Carpenter Steel Co., New Brunswick, N. J.
Wickwire Spencer Steel Div., The Colorado Fuel & Iron Corp., New York, N. Y.
Wisconsin Wire Works, Appleton, Wis.

WIRE—Stainless Steel
American Chain & Cable Co., Page Steel & Wire Div., Monessen, Pa.
American Steel & Wire Div., United States Steel Corp., Cleveland, Ohio
Jones & Laughlin Steel Corp., Stainless and Strip Div., Detroit, Mich.
Malin & Co., The, Cleveland, Ohio
Maryland Fine & Specialty Wire Co., Inc., Cockeysville, Md.
Nippon Stainless Steel Wire Mfg. Co., Ltd., Osaka, Japan.
Pittsburgh Steel Co., Pittsburgh, Pa.
Webb Wire Div., Carpenter Steel Co., New Brunswick, N. J.
Wisconsin Wire Works, Appleton, Wis.

WIRE—Steel—Also Coppered and Galvanized Steel
American Steel & Wire Div., United States Steel Corp., Cleveland, Ohio
Bethlehem Steel Co., Bethlehem, Pa.
Colorado Fuel and Iron Corporation, Denver, Oakland & New York City.
Continental Steel Corp., Kokomo, Ind.
Detroit Steel Corporation, Detroit, Mich.
Jones & Laughlin Steel Corporation, Pittsburgh, Pa.
Keystone Steel & Wire Co., Peoria, Ill.
Malin & Co., The, Cleveland, Ohio
Maryland Fine & Specialty Wire Co., Inc., Cockeysville, Md.
Pittsburgh Steel Co., Pittsburgh, Pa.
Roebling's, John A., Sons Div., Colorado Fuel & Iron Corp., Trenton, N. J.
Rylands Brothers, Limited, Warrington, England
U. S. Steel Export Co., New York, N. Y.
Wickwire Brothers, Inc., Cortland, N. Y.
Wickwire Spencer Steel Div., The Colorado Fuel & Iron Corp., New York, N. Y.

WIRE—Straightening and Cutting
Colorado Fuel and Iron Corporation, Denver, Oakland & New York City.
Jones & Laughlin Steel Corporation, Pittsburgh, Pa.
Wickwire Brothers, Inc., Cortland, N. Y.
Wickwire Spencer Steel Div., Colorado Fuel & Iron Corp., New York, N. Y.
Wisconsin Wire Works, Appleton, Wis.

WIRE—Stranded & Bunched
Hudson Wire Co., Ossining, N. Y.
Laribee Wire, Inc., Camden, N. Y.

WIRE—Tinned
Camden Wire Co., Camden, N. Y.
Laribee Wire, Inc., Camden, N. Y.

WIRE—Zinc
Platt Bros. & Co., The, Waterbury, Conn.
Stamford Processing Co., Peekskill, N. Y.

WOOD—for Guide Rolls, Bushings, Wear Parts, etc.
American Wood Working Co., Montello, Wisc.

WRAPPING PAPER—Creped
(See PAPER-Creped Wrapping)

YARN TESTERS—
Scott Testers, Inc., Providence, R. I.

YARNS—Wire Insulating
Chadwick Yarn Company, Pawtucket, R. I.
Synthetic Thread Co., Bethlehem, Pa.

The WATSON MACHINE COMPANY

ESTABLISHED 1845

PATERSON 16, NEW JERSEY, U. S. A.

ELECTRICAL WIRE AND CABLE, WIRE ROPE, CORDAGE AND MASTICATING MACHINERY MANUFACTURERS

WATSON

PLANETARY STRANDERS. Three types, many sizes, for all duties, geared or ring backturn, main rotor shaft or roller support. "Shaftless" no-loose-part cradles.

RIGID FRAME STRANDERS "RH". Horizontal, overhung spindle designs. Ball bearing main rotor shaft support, no support rollers.

CABLERS. Planetary and High Speed types.

CLOSERS. Planetary, Rigid Frame and High Speed types for Wire Rope and Electric Cables.

HEAVY DUTY TAKEUPS. "Shaftless" in many designs and sizes. Mechanical, hydraulic and motorized lift.

TUBULAR STRANDERS "TH". High speed type in all sizes.

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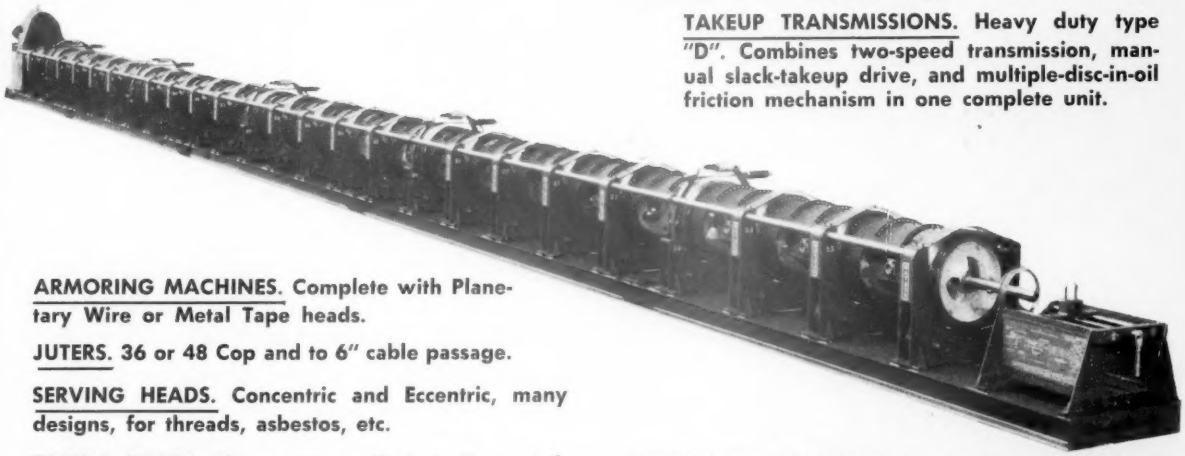
VERTICAL BUNCHERS. Minimum floor space, double twist types. 250, 500 and 1,000 pound capacity.

CONTINUOUS TAKEUPS. Double reel designs, constant tension, wide speed range.

TAKEUP TRANSMISSIONS. Heavy duty type "D". Combines two-speed transmission, manual slack-takeup drive, and multiple-disc-in-oil friction mechanism in one complete unit.



ARMORING MACHINES. Complete with Planetary Wire or Metal Tape heads.

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SERVING HEADS. Concentric and Eccentric, many designs, for threads, asbestos, etc.

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GANG SPOOLERS. Table and Floor types in many sizes and designs.

REWINDERS AND COILERS. All motorized, for warehouse and shipping use.

CAPSTAN TAKEUPS. Single and in multiples.

AUTOMATIC TRAVERSES. Many sizes and designs cover range from fine wire to large cable and wire rope. Wide lay range. Fully automatic and disconnectible for manual operation. Widely used as replacements for inadequate mechanisms on older takeups.

VULCANIZERS. Cavity and Plate "Patch" units. Mechanically or pneumatically operated.

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REEL CRUTCHES. For turning very large and heavy reels. Widely used wherever reel handling is a problem. Available from stock.

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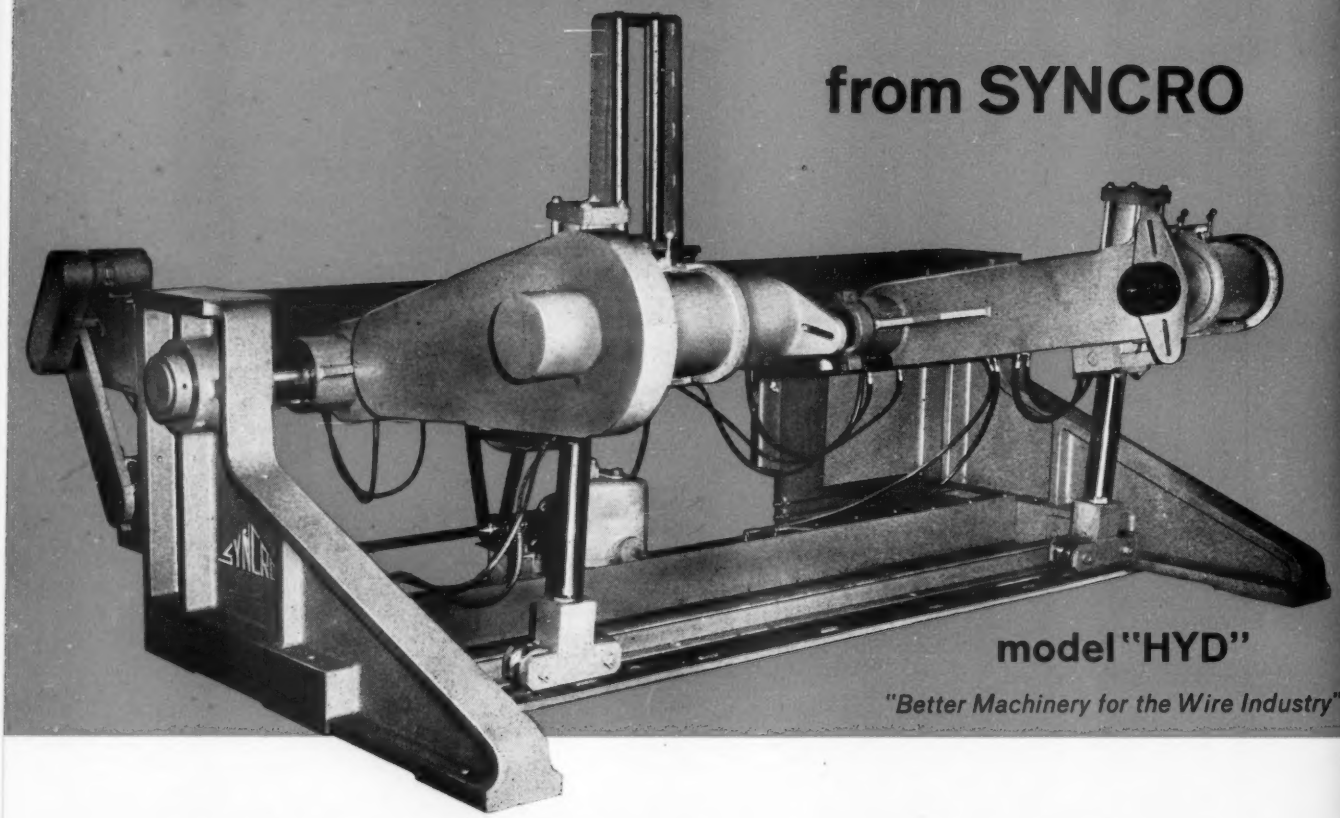

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"Better Machinery for the Wire Industry"

* Reel pintle arms for lowering and elevating reels—actuated hydraulically.

* Drive dogs, conveniently positioned by free-wheeling feature.

* Power booster automatically pulses for pre-set period during acceleration—This assist is valuable when relatively light sections of strand are being reeled and also in the event of a re-start on a partially filled reel.

* Traverse provided with infinite pitch adjustment.

* Drive by independent means, or mechanically through slip clutch. Optional mechanical drive could be effected from capstan of a producing machine such as a strander.

We cordially invite you, as a member of the Electric Wire & Cable Section of the Wire Association, to visit our plant and offices in Perth Amboy, New Jersey, at any time during your stay in New York City.

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